Rocky Flats Environmental Technology Site

PRE-DEMOLITION SURVEY REPORT (PDSR)

Building 771 Area AF

REVISION 0

September 13, 2004

CLASSIFICATION REVIEW NOT REQUIRED PER EXEMPTION NUMBER CEX-005-02

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ABBREVIATIONS/ACRONYMS

ACM	Asbestos Containing Material
Be	Beryllium
CDPHE	Colorado Department of Public Health and the Environment
$DCGL_{EMC}$	Derived Concentration Guideline Level – elevated measurement comparison
$DCGL_W$	Derived Concentration Guideline Level – Wilcoxon Rank Sum Test
D&D	Decontamination and Decommissioning
DDCP	Decontamination and Decommissioning Characterization Protocol
DOE	U.S. Department of Energy
DPP	Decommissioning Program Plan
DQA	Data quality assessment
DQOs	Data quality objectives
EPA	U.S. Environmental Protection Agency
FDPM	Facility Disposition Program Manual
HVAC	Heating, ventilation, air conditioning
HSAR	Historical Site Assessment Report
HEUN	Highly Enriched Uranyl Nitrate
IHSS	Individual Hazardous Substance Site
IWCP	Integrated Work Control Package
K-H	Kaiser-Hill
LBP	Lead-based paint
LLW	Low-level waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	Minimum detectable activity
MDC	Minimum detectable concentration
NORM	Naturally occurring radioactive material
NRA	Non-Rad-Added Verification
OSHA	Occupational Safety and Health Administration
PARCC	Precision, accuracy, representativeness, comparability and completeness
PCBs	Polychlorinated Biphenyls
PDS	Pre-demolition survey
PDSR	Pre-demolition survey report
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RFFO	Rocky Flats Field Office
RLC	Reconnaissance Level Characterization
RLCR	Reconnaissance Level Characterization Report
RSA	Removable Surface Activity
RSOP	RFCA Standard Operating Protocol
RSP	Radiological Safety Practices
SVOCs	Semi-volatile organic compounds
TCLP	Toxicity Characteristic Leaching Procedure
TSA	Total surface activity

VOCs	Volatile organic compounds
WSRIC	Waste Stream and Residue Identification and Characterization

EXECUTIVE SUMMARY

A Pre-Demolition Survey was performed to enable compliant disposition and waste management of the east side of the Building 771 First Floor (Area AF), for structural surfaces that exist within six feet of the final grade. This report also provides the radiological status of areas that exist greater than six feet below the final grade.

Because this area will be demolished, the characterization was performed in accordance with the Pre-Demolition Survey Plan (MAN-127-PDSP). Building surfaces characterized as part of this PDS include the interior surfaces of Area AF (within six feet of the final grade).

The PDS encompassed both chemical and radiological characterization. The characterization was built upon physical, chemical and radiological hazards identified in the facility-specific *B771 and B774 Hazards Characterization Report for the 771 Closure Project.*

Based upon the results of this PDSR, portions of Area AF meet the unrestricted release limits specified in the site Pre-Demolition Survey Plan. After multiple hydrolazing passes (with 35,000 to 50,000 psi high pressure water) which removed ¼" to ½" of surface concrete, and extensive dry decontamination efforts, several areas of the structure do not meet unrestricted release limits. The areas of the structure that do not meet unrestricted release limits and exist within six feet of final grade will be covered with fixative and packaged as radiological waste during building demolition.

No removable contamination in excess of the unrestricted release limits (20 dpm/100 cm^2) exists in Area AF. No beryllium contamination has been detected above the action level in Area AF. In addition, radiological controls shall be in place during demolition to assure there is no release of contamination. These controls shall include the use of water and fixative for dust suppression, air sampling, and continuous RCT coverage. Air sampling shall include localized low-volume air monitors within the demolition zone and lapel air samplers for appropriate operators and support personnel.

The contaminated surfaces (i.e., painted surfaces within 6' of final grade) will be carefully removed during demolition activities. A bright-colored fixative will be used to allow for visible detection of these areas by operators and waste personnel. In the event painted debris becomes mixed with the areas of concrete that have been free-released, these portions will be dispositioned as radiological waste to the extent practicable (i.e., all debris where paint is visible and any areas where contaminated concrete may have mixed with areas of concrete that have been free-released). All attempts will be made to minimize mixing of clean and contaminated concrete during demolition.

The remainder of the structure can be demolished and the concrete can be used for backfill on-site per the RFCA RSOP for Recycling Concrete. The structural surfaces that exist greater than six feet below final grade that meet the established limits (less than 100 nCi/g surface and less than 7 nCi/g over the volume of concrete) will remain in place. All metal items (primarily rebar) removed during demolition shall be packaged as

radiological waste. To ensure that the facility remains free of contamination and PDS data remain valid, Level 1 isolation controls are established.

1 INTRODUCTION

A Pre-Demolition Survey was performed to enable compliant disposition and waste management of the east side of Building 771 First Floor (Area AF). Because this Type 3 building will be demolished, the characterization was performed in accordance with the Pre-Demolition Survey Plan (MAN-127-PDSP). The results of this survey shall demonstrate that the structural concrete to be used for fill material meets the unrestricted release limits specified in the site Pre-Demolition Survey Plan. The results of this survey also demonstrate that major portions of Area AF do not meet the unrestricted release limits. These areas shall be segregated and packaged as radiological waste during building demolition. Building surfaces characterized as part of this PDS include the interior surfaces of the east half of the Building 771 first floor (within six feet of the final grade).

Data is also provided for structural surfaces that exist greater than 6' below final grade to demonstrate compliance with the established limits (less than 100 nCi/g surface and less than 7 nCi/g over the volume of concrete). These areas were characterized per the *Building 771/774 Closure Project Characterization Plan for Areas Greater than Six Feet Below Final Grade*, dated November 24, 2003 (refer to Attachment H). This portion of the structure shall remain in place.

As part of the Rocky Flats Environmental Technology Site (RFETS) Closure Project, numerous facilities will be removed. Among these is Area AF. This facility no longer supports the RFETS mission and will be removed to reduce Site infrastructure, risks and/or operating costs.

Before this Type 3 facility can be demolished, the Data Quality Objectives (DQOs) for a Pre-Demolition Survey (PDS) must be satisfied; this document presents the PDS results for Area AF. The PDS was conducted pursuant to the Decontamination and Decommissioning Characterization Protocol (MAN-077-DDCP) and the Pre-Demolition Survey Plan for D&D Facilities (MAN-127-PDSP). The PDS is built upon physical, chemical and radiological hazards identified in the facility-specific *B771 and B774 Hazards Characterization Report for the 771 Closure Project*, dated June 12, 2001, Revision 0.

1.1 PURPOSE

The purpose of this report is to communicate and document the results of Area AF. A PDS is performed prior to building demolition to define the pre-demolition radiological and chemical conditions of a facility. The pre-demolition conditions are compared with the release limits for radiological and non-radiological contaminants. PDS results will enable project personnel to make final disposition decisions, develop related worker health and safety controls, and estimate waste volumes by waste types.

1.2 SCOPE

This report presents the pre-demolition radiological and chemical conditions of the Area AF surfaces that will be free-released and used as backfill per the requirements of the *RFETS, RFCA RSOP for Recycling Concrete.* The results of this report also demonstrate

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that major portions of Area AF do not meet the unrestricted release limits. These areas shall be segregated and packaged as radiological waste during building demolition.

Also included in the scope of this report is the characterization of the structural surfaces that exist greater than six feet below final grade that were surveyed in accordance with the *Building 771/774 Closure Project Characterization Plan for Areas Greater than Six Feet Below Final Grade*, dated November 24, 2003 (refer to Attachment H).

1.3 DATA QUALITY OBJECTIVES (FOR FREE RELEASE)

The Data Quality Objectives (DQOs) used in designing this PDS meet the minimum requirements specified in Section 2.0 of the Pre-Demolition Survey Plan for D&D Facilities (MAN-127-PDSP). Refer to section 2.0 of MAN-127-PDSP for these DQOs.

The DQOs for the areas that exist greater than 6' below final grade are discussed in the *Building 771/774 Closure Project Characterization Plan for Areas Greater than Six Feet Below Final Grade*, dated November 24, 2003 (refer to Attachment H).

1.3.1 The Problem

The problem involves determining whether or not the survey unit is suitable for unrestricted release in accordance with this plan.

1.3.2 The Decision

The decision is verification that objectives specified in the decommissioning decision document have been met (e.g., certain materials meet unrestricted release criteria for radiological and non-radiological constituents).

1.3.3 Inputs to the Decision

Inputs to the decision include the magnitude and location of data from preceding characterizations, including RLC and In-Process Characterization (IPC), PDS results, decision document action levels, and unrestricted release criteria.

1.3.4 Decision Boundaries

The decision boundaries are the spatial confines of the facility, including rooms and sets of rooms, in two and three dimensions. Interior surfaces are included, including those below grade. Boundaries may be further defined in RFCA decision documents.

1.3.5 Decision Rules

The following are decision rules to be used during PDS:

1.3.5.1 Radionuclides

If all radiological survey and scan measurements are below the surface contamination guidelines specified in the Site PDSP, then the related areas and/or volume are considered not radiologically contaminated.

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If any radiological survey or scan measurement exceeds the surface contamination guidelines provided in the Pre-Demolition Survey Plan for D&D Facilities (MAN-127-PDSP), the related survey unit must be evaluated per the statistical tests described in section 7.0, Data Analysis and Quality Assessment, of this plan.

1.3.5.2 Hazardous Waste

If decommissioning waste is mixed with or contains a listed hazardous waste, or if the waste exhibits a characteristic of a hazardous waste, then the waste is considered RCRA-regulated hazardous waste in accordance with 6 CCR 1007-3, Parts 261 and 268.

1.3.5.3 Hazardous Substances

If material contains a listed hazardous substance above a decision document action level (e.g., RFCA) and/or the CERCLA reportable quantity (40 CFR 302.4), the material is subject to CERCLA regulation (i.e., remediation and/or notification requirements).

1.3.5.4 Beryllium

If surface concentrations of beryllium are equal to or greater than 0.2 $\mu g/100\ cm^2$, the material is considered beryllium contaminated per 10 CFR 850.

1.3.5.5 PCBs

If material contains PCBs, in a non-liquid state, from the manufacturing process at concentrations ≥50 ppm, the material is considered PCB Bulk Product Waste and subject to the requirements of 40 CFR 761.

If PCB contamination from a past spill/release is suspected, or if a PCB spill is discovered that has not been cleaned up, the associated material is considered PCB Remediation Waste and subject to the requirements of 40 CFR 761. PCB remediation waste includes: materials disposed of prior to April 18, 1978, that are currently at concentrations ≥50 ppm PCBs, regardless of the concentration of the original spill; materials which are currently at any volume or concentration where the original source was ≥500 ppm PCBs beginning on April 18, 1978, or ≥50 ppm PCBs beginning on July 2, 1979; and materials which are currently at any concentration if the PCBs are spilled or released from a source not authorized for use under 40 CFR 761.

If a waste or item contains PCBs in regulated concentrations, the waste or item is classified as PCB-regulated material and subject to the requirements of 40 CFR 761.

1.3.5.6 Asbestos

If any one sample of a sample set representing a homogeneous medium results in a positive detection (i.e., >1% by volume), then material is considered ACM (40 CFR 763 and 5 CCR 1001-10).

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1.3.6 Tolerable Limits on Decision Error

Acceptable false negative *(a)* errors for calculating the number of samples generally range from 1% to 10%. The default value specified by the Site PDSP is 5%, which was assumed for the survey design in this report.

1.3.7 Optimization of Plan Design

Statistically based radiological surveying and sampling will be conducted per the guidance in Appendix B of the RFETS Pre-Demolition Survey Plan for D&D Facilities (MAN-127-PDSP). Refer to Section 4.0 of the PDSP for direction of characterization of non-radiological, chemical constituents. For this report, the minimum number of measurement locations is fifteen per 100 square meters of TOTAL AREA for Class 1 survey units (771074 and 771075), and fifteen per 1000 square meters of TOTAL AREA for Class 2 survey units (771088), as calculated based on the guidance in MAN-127-PDSP. The total area was used for conservatism, because a large percentage of the floor area exists more than 6' below final grade, and does not fall within the boundaries of the survey unit.

The $DCGL_W$ is 100 dpm/100 cm^2 for TSA and media measurements/samples, and 20 dpm/100 cm^2 for RSA measurements. The LBGR was adjusted to obtain a relative shift of two. The estimated standard deviation for each measurement type was calculated based on an assumed coefficient of variation of 30%.

The scan requirements for specific survey unit classifications are as follows:

Class 1: 100% of accessible surfaces
Class 2: 10 to 50% of upper walls/ceiling

No Class 3 survey units are included in the scope of this report.

2 HISTORICAL SITE ASSESSMENT

A facility-specific Hazards Characterization Report was conducted to understand the facility history and related hazards. The Building 771 Hazards Characterization was performed in June 2001 (Refer *B771 and B774 Hazards Characterization Report for the 771 Closure Project*, dated June 12, 2001, Revision 0). Based on the characterization results, radiological contamination is suspect on the structural surfaces of the 1st Floor of Building 771 (including Area AF). Therefore, all paint was removed from Area AF (areas within 6' of final grade).

The area included in the scope of this PDSR is referred to herein Area AF. This area was part of the original building 771 construction, and included Rooms 114, 149, and 141 (referred to as the "Infinity Room"). All of these areas supported plutonium processing and recovery and housed numerous gloveboxes and tanks that contained highly radioactive solutions and components. A detailed description of these areas is provided in Revision 0 of the B771 and B774 Hazards Characterization Report (dated 06/12/01).

Approximately 2500 linear feet of embedded unistrut exists in Area AF. Several attempts were made to decontaminate the unistrut to unrestricted release limits. However, due to the geometry of the unistrut, the decontamination and follow-up survey efforts were hindered. Removing the unistrut prior to demolition would be unusually difficult and would result in a considerable risk to the workers. Removing the contaminated unistrut post-demolition could be attempted either manually or mechanically. However, both methods result in a relatively dangerous working environment. Therefore, per agreement with the DOE and CDPHE (refer to Contact Record dated October 2, 2003), the unistrut was decontaminated to the extent practicable and will remain in-place provided the unistrut does not adversely impact the ability to meet the compaction requirements. Remaining contamination levels on the unistrut is typically less than 1000 dpm/100 cm^2 (fixed alpha), with limited areas up to 20,000 dpm/100 cm^2 (fixed alpha). Fixative has been applied to the unistrut for contamination control during demolition.

Area AF consists of two Class 1 survey units (771074 and 771075), and one Class 2 survey unit (771088) based on the contamination potential, per Section 3.0 of the PDSP.

The hazards characterization results and historical review (refer to Attachment G) were used to identify PDS data gaps and needs, and to develop radiological and chemical PDS characterization packages. Characterization documentation is located in the Building 771 Characterization Project files.

3 RADIOLOGICAL CHARACTERIZATION AND HAZARDS

Area AF was characterized for radiological hazards per the PDSP. Radiological characterization was performed to define the nature and extent of radioactive materials that may be present on the facility surfaces. Measurements were performed to evaluate the contaminants of concern (weapons-grade plutonium isotopes). Based upon a review of the characterization data, historical and process knowledge, in-process survey data, building walk-downs, and the Site Pre-Demolition Survey Plan (MAN-127-PDSP), a Radiological Characterization Plan was developed during the planning phase that describes the minimum survey requirements (refer to survey packages 771074, 771075, and 771088). A Survey Unit Overview Map is presented in Attachment A. Based on hazard characterization data and historical and process knowledge, transuranic isotopes are the primary contaminants of concern in Buildings 771/774. Therefore, the PDS was performed to the transuranic PDS unrestricted release criteria. Individual radiological survey unit packages are maintained in the Building 771 Characterization Project files.

The Area AF survey unit packages were developed in accordance with Radiological Safety Practices (RSP) 16.01, *Radiological Survey/Sampling Package Design, Preparation, Control, Implementation and Closure.* Total surface activity (TSA) and removable surface activity (RSA) measurements were collected in accordance with RSP 16.02 *Radiological Surveys of Surfaces and Structures.* Radiological survey data were verified, validated and evaluated in accordance with RSP 16.04, *Radiological Survey/Sample Data Analysis.* Quality control measures were implemented relative to the survey process in accordance with RSP 16.05, *Radiological Survey/Sample Quality Control.*

For this report, the minimum number of measurement locations is fifteen per 100 square meters of TOTAL AREA for Class 1 survey units (771074 and 771075), and fifteen per 1000 square meters of TOTAL AREA for Class 2 survey units (771088), as calculated based on the guidance in MAN-127-PDSP. The total area was used for conservatism, because a large percentage of the floor area exists more than 6' below final grade, and does not fall within the boundaries of the survey unit.

Random survey locations that landed on previously identified "hot-spots" (i.e., areas shaded in red on survey unit overview maps) were relocated as close to the original location as possible within the contiguous square-meter. When this was not possible, a new random location was selected from a random-number generator.

The contamination levels for areas beneath fixative (annotated in yellow on survey unit maps) range from 240 dpm/100 cm^2 to 640 dpm/100 cm^2, with higher areas of contamination up to 8000 dpm/100 cm^2 in bay U-14 and 6000 dpm/100 cm^2 at column P-14. The contamination levels beneath the spots that do not meet unrestricted release limits (annotated in red on survey unit maps) range from 120 to 4600 dpm/100 cm^2.

During the performance of gamma scans with the Bicron Fidler 5-inch NaI scintillator on the morning of September 2, two previously unidentified hotspots were detected on the floor near columns F10 and D10 with measurements of 450,000 and 500,000 cpm respectively. This was unexpected since previous Fidler surveys of these two locations showed levels well below 250,000 cpm. Subsequent surveys with a different Fidler later that same day showed levels of approximately 150,000 cpm and 200,000 cpm, respectively. It was later determined that the Fidler instrument showing the higher than expected levels had an intermittent malfunction which caused it to fail in a conservative direction (e.g. It reported activity at levels much higher than actual.) The instrument was tagged out-of-service.

Due to this anomaly, the Project took several actions to demonstrate that the two erroneous hotspots did in fact meet the established surface limits of 100 nCi/g and volumetric limits of 7 nCi/g and to validate previous Fidler data. As mentioned above, subsequent Fidler surveys of these two locations were performed with levels of approximately 150,000 cpm and 200,000 cpm; both levels were well below the 250,000 cpm action limit. Next, the Project performed gamma spectroscopy surveys (Eberline Services) on the two spots.

For the first hotspot reading of approximately 150,000 cpm, gamma spectroscopy surveys were performed with the detector directly over the spot and then with the detector elevated slightly. The results for these first two sets of surveys were 58 nCi/g surface and 0.5 nCi/g volumetric with the detector directly over the hotspot, and 53 nCi/g surface and 0.45 nCi/g volumetric with the detector elevated slightly. The results for the second hotspot were 93.8 nCi/g surface and 0.8 nCi/g volumetric with the detector directly over the hotspot, and 30 nCi/g surface and 0.26 nCi/g volumetric with the detector elevated slightly. (The values for the second hotspot were conservatively high since the measurement included contribution from a contaminated section of slab next to the hotspot that had been marked for removal as radioactive waste prior to demolition and

was identified with concrete saw cuts around it.) In both cases the levels were below the established limits; however, as a best management practice both hotspots were remediated.

To validate the adequacy of previous Fidler measurements, the Project performed Fidler scans around the boundaries of all slab sections in Area AF marked for removal as radioactive waste. (These slab sections were readily identifiable since concrete saw cuts bounded each of these sections.) The results of the Fidler scans from the edge of the saw cuts out to 12 inches showed all levels below 150,000 cpm. The results of these extensive scans support the findings of all previous Fidler scans on the floor.

Lastly, the Project performed detailed Fidler surveys of six previously identified hotspots below the 250,000 cpm level to demonstrate that the hotspots in Area AF are very discrete in general and that the average activity around the hotspots is significantly lower. To accomplish this survey, a series of nine Fidler measurements was taken for each hotspot with the hotspot in the center of the nine-point array. An average for the nine points was calculated and compared to the hotspot. In all cases the surrounding eight measurements were below the hotspot and the average of the nine measurements was typically only 20% to 30% of the hotspot itself.

In total, these supplemental surveys demonstrate that the two hotspots were indeed below the established surface limits of 100 nCi/g and volumetric limits of 7 nCi/g. These supplemental surveys also validate the results of previous Fidler surveys which show compliance with the surface limits.

Radiological survey data, statistical analysis results, survey locations, and radiological scan maps are presented in Attachments B, C, and D, *Radiological Data Summary and Survey Maps*.

Area AF South – (Survey Unit 771074)

The south side of Area AF is classified as a Class 1 survey unit. This area encompasses the north side of the former Room 149. A total of 89 random TSA and RSA measurements were collected. Surface scans of 701 m^2 (100% of accessible surfaces within 6' of final grade/areas not covered with fixative) were performed. All paint was removed from the structural surfaces; therefore no media samples were collected for this survey unit. Fixative has been applied to several areas of elevated activity in survey unit 771074, and this concrete will be packaged as radiological waste during demolition.

Surfaces that exist greater than 6' below final grade were characterized per the requirements of the *Building 771/774 Closure Project Characterization Plan for Areas Greater than Six Feet Below Final Grade*, dated November 24, 2003 (refer to Attachment H). The structural surfaces that exist greater than six feet below final grade that meet the established limits (less than 100 nCi/g surface and less than 7 nCi/g over the volume of concrete) will remain in place (refer to Attachment H). Surfaces that did not meet the established surface limits (100 nCi/g) were removed with a scabbling tool or grinder. Areas that did not meet the established volumetric limits (7 nCi/g) were removed with a concrete saw. All areas that were removed are delineated in Attachment H.

An estimate of the total remaining weapons-grade plutonium activity (WGP) for the AF structural surfaces that exist greater than 6' below the final grade and will remain in place, is provided in Attachment H. This value was calculated based on the results of the random in-situ gamma-spectroscopy measurements.

All scans and surveys in survey unit 771074 were less than the applicable PDS transuranic DCGL values, with the exception of the areas marked in red on the survey unit map. Radiological survey data, statistical analysis results, survey locations, and radiological scan maps for survey unit 771074 are presented in Attachment B, *Survey Unit 771074 Radiological Data Summary and Survey Map.*

Area AF North – (Survey Unit 771075)

The north side of Area AF is classified as a Class 1 survey unit. This area is the former Room 114. A total of 175 random TSA and RSA measurements were collected. Surface scans of 1416 m^2 (100% of accessible surfaces within 6' of final grade/areas not covered with fixative) were performed. All paint was removed from the structural surfaces; therefore no media samples were collected for this survey unit. Fixative has been applied to several areas of elevated activity in survey unit 771075, and this concrete will be packaged as radiological waste during demolition.

The structural surfaces that exist greater than six feet below final grade that meet the established limits (less than 100 nCi/g surface and less than 7 nCi/g over the volume of concrete) will remain in place (refer to Attachment H). Surfaces that did not meet the established surface limits (100 nCi/g) were removed with a scabbling tool or grinder. Areas that did not meet the established volumetric limits (7 nCi/g) were removed with a concrete saw. All areas that were removed are delineated in Attachment H.

All scans and surveys in survey unit 771075 were less than the applicable PDS transuranic DCGL values, with the exception of the areas marked in red on the survey unit map. Radiological survey data, statistical analysis results, survey locations, and radiological scan maps for survey unit 771075 are presented in Attachment C, *Survey Unit 771075 Radiological Data Summary and Survey Map.*

Area AF East Stairwell – (Survey Unit 771088)

The stairwell in the southeast corner of Area AF is classified as a Class 2 survey unit. This area encompasses the emergency exit stairwell from Door 8. A total of 15 random TSA and RSA measurements were collected. Surface scans of 10 m^2 (12% of accessible surfaces within 6' of final grade) were performed. There is no paint on the structural surfaces (with the exception of the metal stairwell, which is original paint); therefore no media samples were collected for this survey unit. No areas of elevated activity in excess of the unrestricted release limits were identified in this survey unit.

Surfaces that exist greater than 6' below final grade were characterized per the requirements of the *Building 771/774 Closure Project Characterization Plan for Areas Greater than Six Feet Below Final Grade*, dated November 24, 2003 (refer to Attachment

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H). The structural surfaces that exist greater than six feet below final grade that meet the established limits (less than 100 nCi/g surface and less than 7 nCi/g over the volume of concrete) will remain in place (refer to Attachment H). No areas exceeding the established surface limits (100 nCi/g) or volumetric limits (7 nCi/g) were identified in this area.

All scans and surveys in survey unit 771088 were less than the applicable PDS transuranic DCGL values. Radiological survey data, statistical analysis results, survey locations, and radiological scan maps for survey unit 771088 are presented in Attachment D, *Survey Unit 771088 Radiological Data Summary and Survey Map*.

4 CHEMICAL CHARACTERIZATION AND HAZARDS

Based on a thorough review of historical and process knowledge, visual inspections, and personnel interviews, no additional chemical hazard sampling requirements were identified.

4.1 Asbestos

Asbestos containing building material is not present in or on Area AF (previously removed).

4.2 Beryllium (Be)

Area AF is not and has never been a beryllium-controlled area. However, Beryllium was detected in a limited number of gloveboxes in Building 771. Per the Beryllium Sampling Decision Tree in the PDSP, 14 biased beryllium smear samples were collected in Area AF, in accordance with the PDSP and the *Beryllium Characterization Procedure,* PRO-536-BCPR, Revision 0, September 9, 1999.

All beryllium smear sample results were less than the investigative limit of 0.1 $\mu g/100cm^2$. PDS beryllium laboratory sample data and location maps are contained in Attachment E, *Chemical Data Summaries and Sample Maps*.

4.3 RCRA/CERCLA Constituents [including metals and volatile organic compounds (VOCs)]

Based upon the *B771 and B774 Hazards Characterization Report, 771 Closure Project*, Revision 0, dated June 12, 2001, personnel interviews, facility walk-downs, and historical process knowledge (WSRIC/WEMS), several portions of Area AF previously managed hazardous wastes. Specifically, Room 181A was a permitted hazardous waste container storage units. This unit has been decontaminated (e.g., hydrolazed) in accordance with the 771 Decommissioning Operations Plan and has met the "clean closure" decontamination criteria. A visual inspection of the building by 771/774 Industrial Hygiene personnel verified the absence of hazardous waste residuals and/or stains on the floor/concrete slab, walls, or ceiling. As a result of these observances, it has been determined that no sampling for RCRA/CERCLA constituents is required. The concrete generated from the demolition of the areas included in the scope of this report can be used for onsite recycling in accordance with the Concrete Recycling RSOP.

4.4 Polychlorinated Biphenyls (PCBs)

Based on historical knowledge, personnel interviews, and 771/774 Environmental Compliance Personnel walk-downs, Area AF never used/transferred free flowing/exposed PCB's. At one time the facility may have used PCB ballasts in its fluorescent light fixtures, however, all of these have been removed, and compliantly disposed of, resulting in no impact on demolition activities in this area.

5 PHYSICAL HAZARDS

Physical hazards associated with Area AF are common to standard industrial environments. Several large floor penetrations exist that have been filled with grout or fill material (following survey) to avoid fall hazards. In addition, auxiliary lighting is required for access to the area.

Physical hazards are controlled by the Site Occupational Safety and Industrial Hygiene Program, which is based on OSHA regulations, DOE orders, and standard industry practices.

6 DATA QUALITY ASSESSMENT

Data used in making management decisions for decommissioning of Area AF, and consequent waste management, is of adequate quality to support the decisions documented in this report. The data presented in this report (Attachments B, C, D, and E) were verified and validated relative to MAN-127-PDSP, Pre-Demolition Survey Plan for D&D Facilities, and original project DQOs.

In summary, the Verification and Validation (V&V) process corroborates that the following elements of the characterization process are adequate:

- the *number* of samples and surveys;
- the *types* of samples and surveys;
- the sampling/survey process as implemented "in the field"; and
- the laboratory analytical process, relative to accuracy and precision considerations.

Details of the DQA are presented in Attachment F. The DQA Checklists are provided in the individual survey unit packages (located in the Building 771 Characterization Files).

The Minimum Detectable Activity (MDA) for each PDS instrument was determined *a priori* based on typical parameters (background, efficiency, and count time). A list of radiological field instrumentation and associated sensitivities is presented in Table 1.

Table 1
PDS Radiological Field Instrumentation and Minimum Detectable Activities

Model	Measurement Type	MDA (dpm/100 cm^2)
NE Electra DP6	TSA	48
Eberline SAC-4	Removable (Smears)	10
NE Electra AP6	Scans	300

7 DECOMMISSIONING WASTE TYPES

The demolition and disposal of Area AF will generate a variety of wastes. Structural surfaces that exist within 6' of final grade that do not meet unrestricted release limits shall be packaged as radiological waste. These areas shall be delineated with blue paint and yellow fixative, such that they can be easily identified during demolition for segregation and packaging.

The remaining concrete within 6' of final grade can be used as backfill onsite in accordance with the RFCA RSOP for Recycling Concrete. The portions of the structure that exist beneath the 6' grade line can remain in place because they meet the established limits (less than 100 nCi/g at the surface and less than 7 nCi/g over the volume of concrete) (refer to Attachment H). The estimated grams of weapons-grade plutonium (WGP) remaining in Area AF is 0.9 grams (refer to Attachment H).

Any equipment items removed (rebar) will be packaged as radiological waste. Any area that does not meet unrestricted release limits shall be covered with fixative to prevent the release of contamination during demolition activities.

The estimated volume of radiological waste to be generated for this area is 2400 cubic yards. This includes any remaining equipment items, concrete that does not meet the unrestricted release limits, and rebar.

8 FACILITY CLASSIFICATION AND CONCLUSIONS

Based on the analysis of radiological, chemical and physical hazards, Area AF is classified as an RFCA Type 3 facility pursuant to the RFETS Decommissioning Program Plan (DPP; K-H, 1999). Based upon the results of this PDSR, portions of the Area AF structure meet the unrestricted release limits specified in the site Pre-Demolition Survey Plan and are ready for demolition. Areas that are marked in red in Attachments B and C do not meet unrestricted release limits and will be packaged as radiological waste during demolition. The structural surfaces in Area AF that exist beneath the 6' grade line meet the established limits (less than 100 nCi/g at the surface and less than 7 nCi/g over the volume of concrete) therefore can remain in place (refer to Attachment H). The PDS for Area AF was performed in accordance with the DDCP and PDSP, all PDSP DQOs were met, and all data satisfied the PDSP DQA criteria.

A facility walkdown and historical review indicates that no RCRA/CERCLA constituents exist in Area AF (refer to Attachment G, Historical Review). Any painted (paint or fixative) debris generated during demolition will be disposed of as radiological waste.

Radiological contamination in excess of the PDSP Table 7-1 limits was not detected in Area AF (with the exception of the areas in red on maps in Attachments B and C). The applicable limits are as follows:

Table 2
PDSP Table 7-1 Surface Contamination Limits

Radionuclides	Total Average (dpm/100 cm^2) (1) ($DCGL_W$)	Total Maximum (dpm/100 cm^2) (2) ($DCGL_{EMC}$)	Removable (dpm/100 cm^2) ($DCGL_W$)
Transuranics	100	300	20

(1) Measurements of average contamination should not be averaged over an area of more than 1 m^2.
(2) The maximum contamination level applies to an area of not more than 100 cm^2.

Based upon this PDSR, portions of Area AF can be demolished and concrete can be used for backfill on-site per the RFCA RSOP for Recycling Concrete. The areas shaded in red/yellow in Attachments B and C do not meet unrestricted release limits and shall be covered with fixative and packaged as radiological waste during demolition. The portions of the structure that exist beneath the 6' grade line can remain in place because they meet the established limits (less than 100 nCi/g at the surface and less than 7 nCi/g over the volume of concrete). These areas have also been covered with fixative to prevent the release of contamination during demolition activities. No removable contamination in excess of the unrestricted release limits (20 dpm/100 cm^2) exists in Area AF. No beryllium contamination has been detected above the action level in Area AF. In addition, radiological controls shall be in place during demolition to assure there is no release of contamination. These controls shall include the use of water and fixative for dust suppression, air sampling, and continuous RCT coverage. Air sampling shall include localized low-volume air monitors within the demolition zone and lapel air samplers for appropriate operators and support personnel.

The contaminated surfaces (i.e., painted surfaces within 6' of final grade) will be carefully removed during demolition activities. A bright-colored fixative will be used to allow for visible detection of these areas by operators and waste personnel. In the event painted debris becomes mixed with the areas of concrete that have been free-released, these portions will be dispositioned as radiological waste to the extent practicable (i.e., all debris where paint is visible and any areas where contaminated concrete may have mixed with areas of concrete that have been free-released). All attempts will be made to minimize mixing of clean and contaminated concrete during demolition

To ensure that the facility remains free of contamination and that PDS data remain valid, Level 1 isolation controls have been established.

9 REFERENCES

B771 and B774 Hazards Characterization Report for the 771 Closure Project, dated June 12, 2001, Revision 0.

DOE/RFFO, CDPHE, EPA, 1996. *Rocky Flats Cleanup Agreement (RFCA)*, July 19, 1996.

DOE Order 5400.5, *Radiation Protection of the Public and the Environment*

DOE Order 414.1A, *Quality Assurance*

EPA, 1994. *The Data Quality Objective Process,* EPA QA/G-4.

K-H, 1999. *Decommissioning Program Plan*, June 21, 1999.

MAN-131-QAPM, *Kaiser-Hill Team Quality Assurance Program*, Rev. 1, November 1, 2001.

MAN-076-FDPM, *Facility Disposition Program Manual*, Rev. 3, January 1, 2002.

MAN-077-DDCP, *Decontamination and Decommissioning Characterization Protocol*, Rev. 4, July 15, 2002.

MAN-127-PDSP, *Pre-Demolition Survey Plan for D&D Facilities*, Rev. 1, July 15, 2002.

MARSSIM - *Multi-Agency Radiation Survey and Site Investigation Manual* (NUREG-1575, EPA 402-R-97-016).

PRO-475-RSP-16.01, *Radiological Survey/Sampling Package Design, Preparation, Control, Implementation, and Closure,* Rev. 1, May 22, 2001.

PRO-476-RSP-16.02, *Pre-Demolition (Final Status) Radiological Surveys of Surfaces and Structures*, Rev. 2, March 10, 2003.

PRO-477-RSP-16.03, *Radiological Samples of Building Media*, Rev. 1, May 22, 2001.

PRO-478-RSP-16.04, *Radiological Survey/Sample Data Analysis for Final Status Survey*, Rev. 1, May 22, 2001.

PRO-479-RSP-16.05, *Radiological Survey/Sample Quality Control for Final Status Survey*, Rev. 1, May 22, 2001.

PRO-563-ACPR, *Asbestos Characterization Procedure,* Revision 0, August 24, 1999.

PRO-536-BCPR, *Beryllium Characterization Procedure*, Revision 0, August 24, 1999.

RFETS, Environmental Waste Compliance Guidance #25, Management of Polychlorinated Biphenyls (PCBs) in Paint and Other Bulk Product Waste During Facility Disposition.

RFETS, Environmental Waste Compliance Guidance #27, Lead-Based Paint (LBP) and Lead-Based Paint Debris Disposal.

RFETS, RFCA RSOP for Recycling Concrete, September 28, 1999

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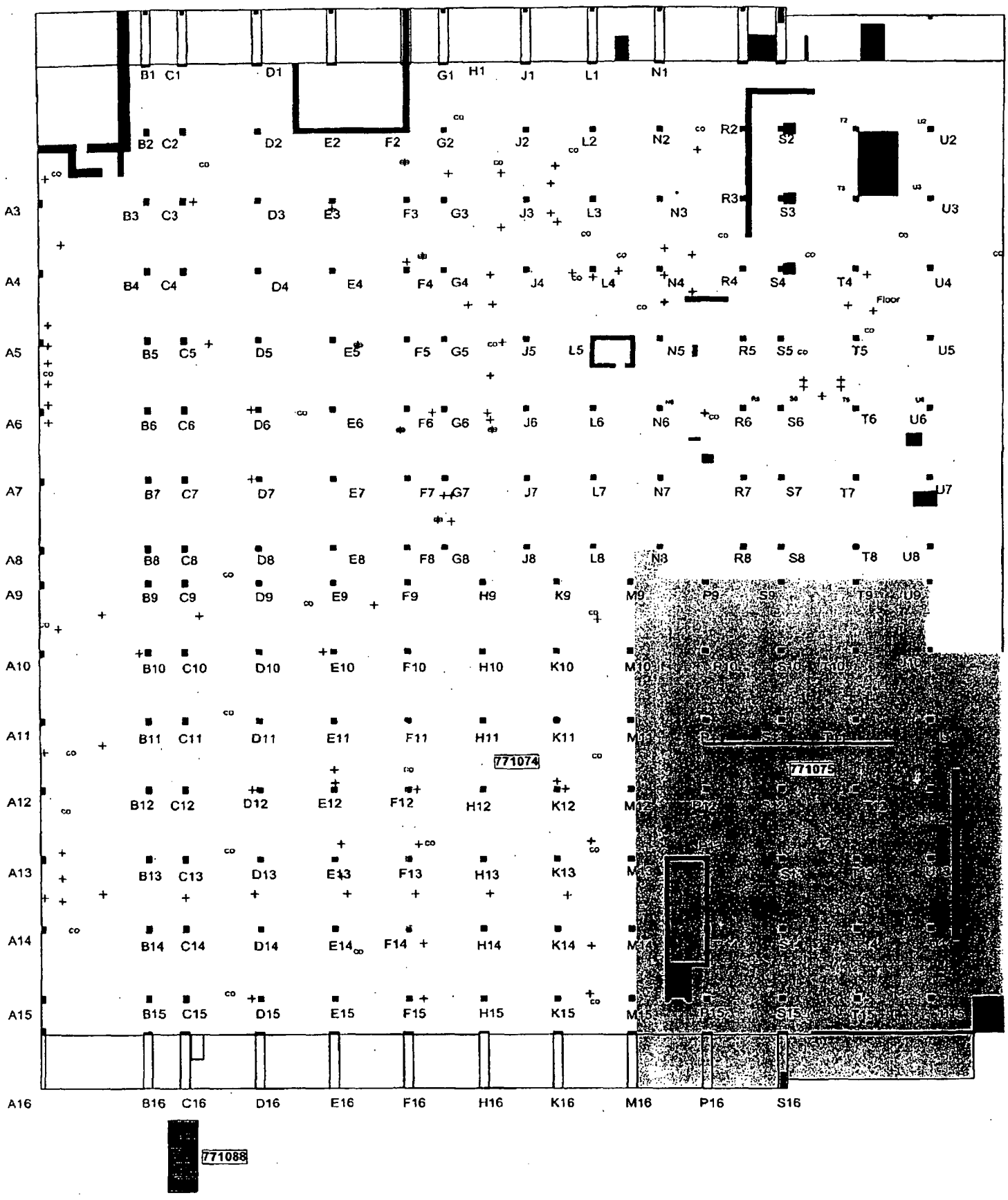
ATTACHMENT A

Survey Unit Overview Map

Building 771 First Floor



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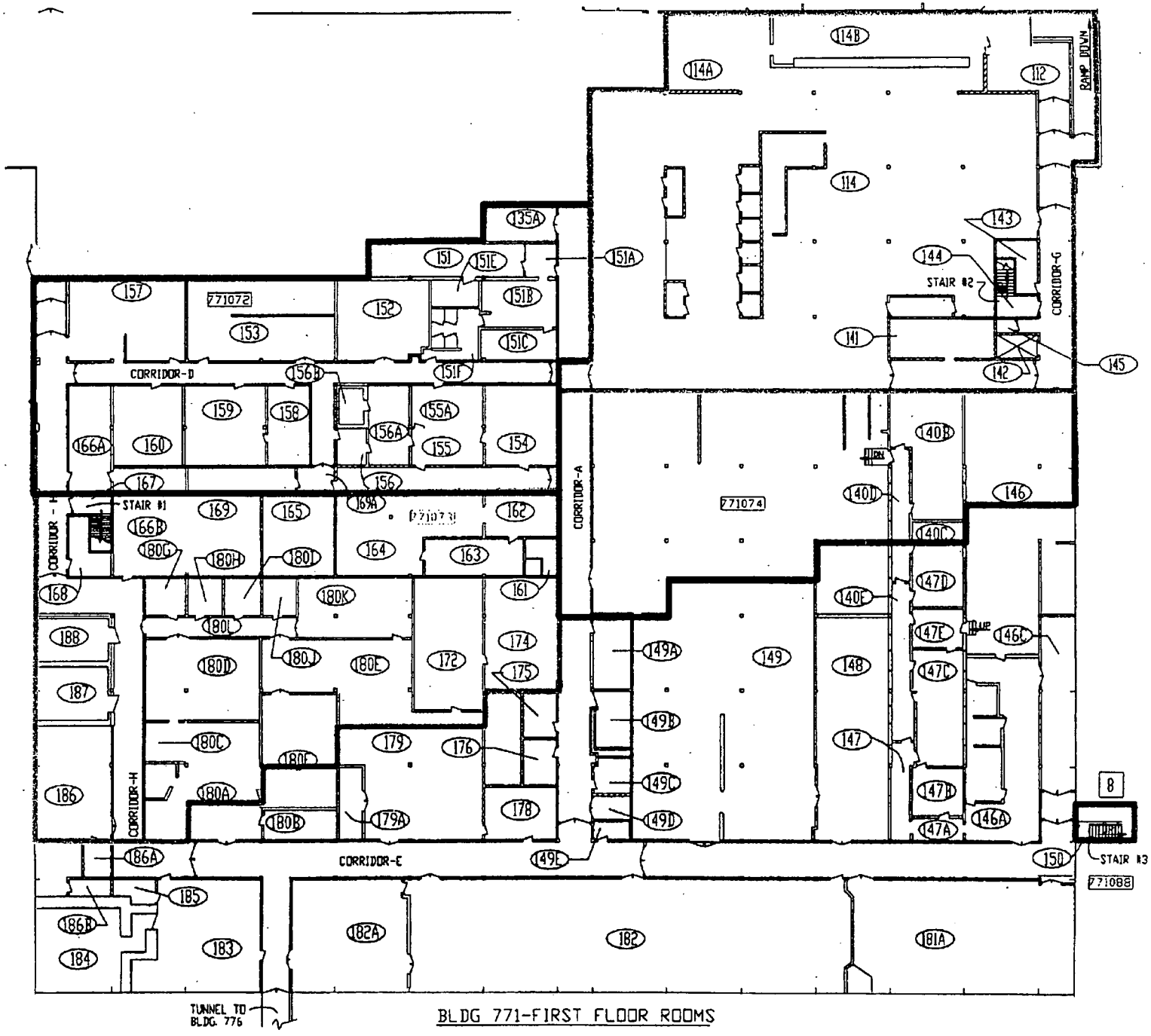

BLDG 771-FIRST FLOOR ROOMS

ATTACHMENT B

Survey Unit 771074
Radiological Data Summary and Survey Map

Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Rocky Flats Environmental Technology Site
Final Radiological Survey Summary Results

Total Surface Activity Measurements

Nbr Random Measurements Required: 89 | Nbr Biased Measurements Required: 0 | Nbr QC Required: 5

Nbr Random Measurements Performed: 89 | Nbr Biased Measurements Performed: 0 | Nbr QC Performed: 5

Alpha

Maximum:	83.5 dpm/100cm²
Minimum:	-1.2 dpm/100cm²
Mean:	31.8 dpm/100cm²
Standard Deviation:	20.6
QC Maximum:	34.4 dpm/100cm²
QC Minimum:	-7.8 dpm/100cm²
QC Mean:	13.8 dpm/100cm²
Transuranic DCGL$_W$:	100.0 dpm/100cm²
Transuranic DCGL$_{EMC}$:	300.0 dpm/100cm²

Removable Surface Activity Measurements

Nbr Random Measurements Required: 89 | Nbr Biased Measurements Required: 0

Nbr Random Measurements Performed: 89 | Nbr Biased Measurements Performed: 0

Alpha

Maximum:	3.9 dpm/100cm²
Minimum:	-1.2 dpm/100cm²
Mean:	0.2 dpm/100cm²
Standard Deviation:	1.2
Transuranic DCGL$_W$:	20.0 dpm/100cm²

Media Sample Results

Nbr Random Required: 0 | Nbr Biased Required: 0

Nbr Random Collected: 0 | Nbr Biased Collected: 0

Conclusion - A comparison of the random, biased and QC measurement results against the PDSP Table 7-1 Surface Contamination Guideline limits was conducted; the comparison demonstrates that this survey unit passes the criterion specified in the PDSP.

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Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Instrument Data Sheet

Inst/RCT Number	RCT ID	Analysis Date	Instr Model	Instru S/N	Probe Type	Calibration Due Dt	Instru Efficiency		A-Priori MDA (dpm/100cm²)		Survey Type
							Alpha	Beta	Alpha	Beta	
3	514979	08/22/04	Electra	1551	DP-6	12/21/04	0.224	NA	48.0	NA	T
11	541020	08/25/04	Electra	1551	DP-6	12/21/04	0.224	NA	48.0	NA	T
12	702353	08/25/04	SAC-4	1410	NA	10/13/04	0.333	NA	10.0	10.0	R
13	702353	08/25/04	SAC-4	1491	NA	09/17/04	0.333	NA	10.0	10.0	R
14	702353	08/25/04	SAC-4	1354	NA	09/18/04	0.333	NA	10.0	10.0	R
15	702353	08/25/04	SAC-4	1185	NA	01/27/05	0.333	NA	10.0	10.0	R
16	513474	08/25/04	Electra	390	DP-6	01/31/05	0.215	NA	48.0	NA	T
17	711754	08/25/04	Electra	2385	DP-6	12/01/04	0.220	NA	48.0	NA	T
18	701841	08/26/04	Electra	390	DP-6	01/31/05	0.215	NA	48.0	NA	T
19	711754	08/26/04	SAC-4	1410	NA	10/13/04	0.333	NA	10.0	10.0	R
20	711754	08/26/04	SAC-4	1491	NA	09/17/04	0.333	NA	10.0	10.0	R
21	711754	08/26/04	SAC-4	1354	NA	09/18/04	0.333	NA	10.0	10.0	R
22	711754	08/26/04	SAC-4	1185	NA	01/27/05	0.333	NA	10.0	10.0	R
23	515011	08/27/04	Electra	1262	DP-6	11/24/04	0.232	NA	48.0	NA	T
24	541020	08/27/04	Electra	1551	DP-6	12/21/04	0.224	NA	48.0	NA	T

Survey Types: T = Total Surface Activity, Q = TSA QC, S = Scan, R = Removable Surface Activity, I = Investigation

Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771074PRP-N001	12	1.2	N/A	
771074PRP-N002	12	-0.3	N/A	
771074PRP-N003	13	0.9	N/A	
771074PRP-N004	14	2.7	N/A	
771074PRP-N005	15	0.6	N/A	
771074PRP-N006	12	1.2	N/A	
771074PRP-N007	13	2.4	N/A	
771074PRP-N008	14	1.2	N/A	
771074PRP-N009	15	-0.9	N/A	
771074PRP-N010	12	1.2	N/A	
771074PRP-N011	13	-0.6	N/A	
771074PRP-N012	19	1.8	N/A	
771074PRP-N013	20	-1.2	N/A	
771074PRP-N014	12	1.2	N/A	
771074PRP-N015	13	-0.6	N/A	
771074PRP-N016	14	-0.3	N/A	
771074PRP-N017	15	-0.9	N/A	
771074PRP-N018	12	-0.3	N/A	
771074PRP-N019	13	-0.6	N/A	
771074PRP-N020	14	-0.3	N/A	
771074PRP-N021	15	2.1	N/A	
771074PRP-N022	12	1.2	N/A	
771074PRP-N023	13	0.9	N/A	
771074PRP-N024	14	-0.3	N/A	
771074PRP-N025	15	0.6	N/A	
771074PRP-N026	12	-0.3	N/A	
771074PRP-N027	13	0.9	N/A	
771074PRP-N028	14	-0.3	N/A	
771074PRP-N029	15	0.6	N/A	

Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771074PRP-N030	12	-0.3	N/A	
771074PRP-N031	12	-0.3	N/A	
771074PRP-N032	13	0.9	N/A	
771074PRP-N033	14	-0.3	N/A	
771074PRP-N034	15	-0.9	N/A	
771074PRP-N035	12	-0.3	N/A	
771074PRP-N036	13	-0.6	N/A	
771074PRP-N037	14	-0.3	N/A	
771074PRP-N038	15	-0.9	N/A	
771074PRP-N039	12	-0.3	N/A	
771074PRP-N040	13	-0.6	N/A	
771074PRP-N041	14	1.2	N/A	
771074PRP-N042	15	-0.9	N/A	
771074PRP-N043	12	-0.3	N/A	
771074PRP-N044	13	-0.6	N/A	
771074PRP-N045	14	-0.3	N/A	
771074PRP-N046	15	-0.9	N/A	
771074PRP-N047	12	2.7	N/A	
771074PRP-N048	13	-0.6	N/A	
771074PRP-N049	14	1.2	N/A	
771074PRP-N050	15	0.6	N/A	
771074PRP-N051	12	-0.3	N/A	
771074PRP-N052	13	3.9	N/A	
771074PRP-N053	14	-0.3	N/A	
771074PRP-N054	15	0.6	N/A	
771074PRP-N055	12	1.2	N/A	
771074PRP-N056	13	-0.6	N/A	
771074PRP-N057	14	1.2	N/A	
771074PRP-N058	15	-0.9	N/A	

Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771074PRP-N059	12	-0.3	N/A	
771074PRP-N060	13	2.4	N/A	
771074PRP-N061	19	0.3	N/A	
771074PRP-N062	14	1.2	N/A	
771074PRP-N063	15	0.6	N/A	
771074PRP-N064	20	-1.2	N/A	
771074PRP-N065	12	1.2	N/A	
771074PRP-N066	21	2.1	N/A	
771074PRP-N067	22	2.4	N/A	
771074PRP-N068	21	0.6	N/A	
771074PRP-N069	22	-0.6	N/A	
771074PRP-N070	19	-1.2	N/A	
771074PRP-N071	20	-1.2	N/A	
771074PRP-N072	21	-0.9	N/A	
771074PRP-N073	13	-0.6	N/A	
771074PRP-N074	14	2.7	N/A	
771074PRP-N075	22	-0.6	N/A	
771074PRP-N076	19	1.8	N/A	
771074PRP-N077	20	-1.2	N/A	
771074PRP-N078	21	-0.9	N/A	
771074PRP-N079	22	-0.6	N/A	
771074PRP-N080	19	1.8	N/A	
771074PRP-N081	15	-0.9	N/A	
771074PRP-N082	20	-1.2	N/A	
771074PRP-N083	21	-0.9	N/A	
771074PRP-N084	22	-0.6	N/A	
771074PRP-N085	19	0.3	N/A	
771074PRP-N086	20	-1.2	N/A	
771074PRP-N087	21	0.6	N/A	

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Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771074PRP-N088	22	-0.6	N/A	
771074PRP-N089	19	0.3	N/A	

Comments:

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Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771074PRP-N001	11	34.5	N/A	
771074PRP-N002	11	58.1	N/A	
771074PRP-N003	11	12.1	N/A	
771074PRP-N004	24	28.2	N/A	
771074PRP-N005	23	44.0	N/A	
771074PRP-N006	11	41.6	N/A	
771074PRP-N007	24	25.5	N/A	
771074PRP-N008	23	12.6	N/A	
771074PRP-N009	11	10.4	N/A	
771074QRP-N010	17	13.1	N/A	
771074PRP-N010	24	1.4	N/A	
771074PRP-N011	24	40.3	N/A	
771074PRP-N012	18	76.5	N/A	
771074PRP-N013	18	11.4	N/A	
771074QRP-N014	17	34.4	N/A	
771074PRP-N014	24	63.9	N/A	
771074PRP-N015	24	10.4	N/A	
771074PRP-N016	24	37.1	N/A	
771074QRP-N017	17	-7.8	N/A	
771074PRP-N017	24	28.2	N/A	
771074PRP-N018	23	47.0	N/A	
771074PRP-N019	11	49.2	N/A	
771074PRP-N020	24	55.0	N/A	
771074PRP-N021	23	35.4	N/A	
771074PRP-N022	24	13.5	N/A	
771074PRP-N023	11	55.0	N/A	
771074QRP-N024	17	34.4	N/A	

Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771074PRP-N024	24	37.1	N/A	
771074PRP-N025	24	67.1	N/A	
771074PRP-N026	24	43.4	N/A	
771074PRP-N027	11	25.5	N/A	
771074PRP-N028	24	5.9	N/A	
771074PRP-N029	24	7.7	N/A	
771074PRP-N030	24	-1.2	N/A	
771074PRP-N031	16	23.9	N/A	
771074QRP-N031	17	-5.1	N/A	
771074PRP-N032	16	20.7	N/A	
771074PRP-N033	16	48.6	N/A	
771074PRP-N034	16	20.7	N/A	
771074PRP-N035	16	27.2	N/A	
771074PRP-N036	16	45.8	N/A	
771074PRP-N037	3	46.1	N/A	
771074PRP-N038	3	28.2	N/A	
771074PRP-N039	3	61.3	N/A	
771074PRP-N040	3	40.3	N/A	
771074PRP-N041	3	37.1	N/A	
771074PRP-N042	3	16.6	N/A	
771074PRP-N043	16	55.1	N/A	
771074PRP-N044	16	48.6	N/A	
771074PRP-N045	16	39.3	N/A	
771074PRP-N046	16	64.4	N/A	
771074PRP-N047	24	43.4	N/A	
771074PRP-N048	16	33.2	N/A	
771074PRP-N049	16	76.5	N/A	

Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771074PRP-N050	16	20.7	N/A	
771074PRP-N051	16	14.6	N/A	
771074PRP-N052	16	20.7	N/A	
771074PRP-N053	16	23.9	N/A	
771074PRP-N054	16	11.4	N/A	
771074PRP-N055	16	8.6	N/A	
771074PRP-N056	16	17.9	N/A	
771074PRP-N057	16	30.0	N/A	
771074PRP-N058	16	23.9	N/A	
771074PRP-N059	16	39.3	N/A	
771074PRP-N060	16	-0.7	N/A	
771074PRP-N061	17	17.2	N/A	
771074PRP-N062	3	43.4	N/A	
771074PRP-N063	3	1.4	N/A	
771074PRP-N064	17	47.2	N/A	
771074PRP-N065	3	13.5	N/A	
771074PRP-N066	18	17.9	N/A	
771074PRP-N067	18	27.2	N/A	
771074PRP-N068	17	77.6	N/A	
771074PRP-N069	17	50.3	N/A	
771074PRP-N070	17	17.2	N/A	
771074PRP-N071	17	26.2	N/A	
771074PRP-N072	17	83.5	N/A	
771074PRP-N073	3	40.3	N/A	
771074PRP-N074	3	4.6	N/A	
771074PRP-N075	17	10.8	N/A	
771074PRP-N076	17	29.0	N/A	

Survey Area: AF	Survey Unit: 771074	Building: 771

Description: First Floor (east side, south end)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771074PRP-N077	17	56.2	N/A	
771074PRP-N078	17	8.1	N/A	
771074PRP-N079	17	35.3	N/A	
771074PRP-N080	17	19.9	N/A	
771074PRP-N081	3	52.3	N/A	
771074PRP-N082	17	10.8	N/A	
771074PRP-N083	17	8.1	N/A	
771074PRP-N084	17	77.6	N/A	
771074PRP-N085	17	8.1	N/A	
771074PRP-N086	17	8.1	N/A	
771074PRP-N087	17	41.2	N/A	
771074PRP-N088	17	8.1	N/A	
771074PRP-N089	17	23.1	N/A	

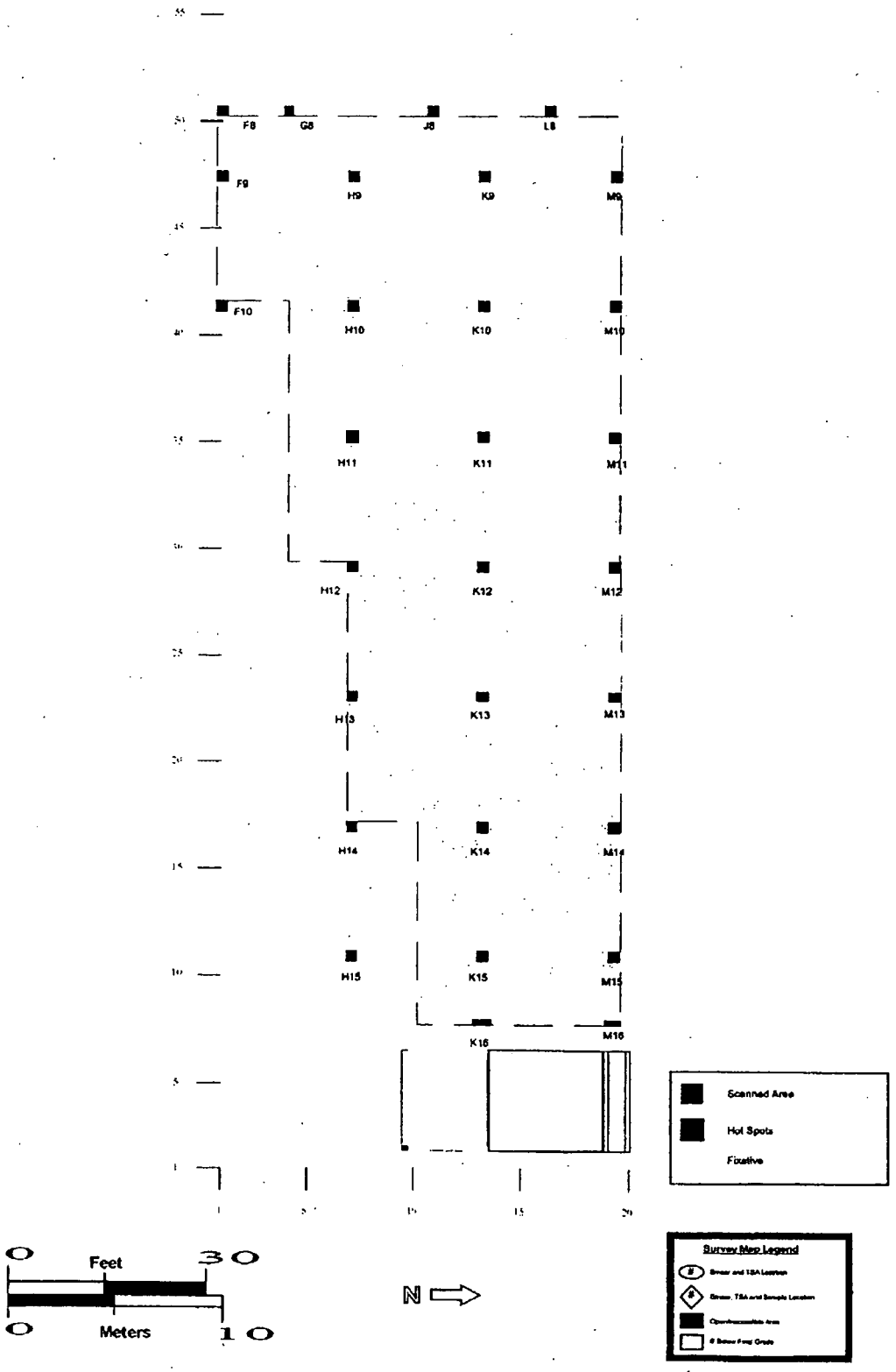
Comments:

RADIOLOGICAL CLOSEOUT SURVEY FOR THE 771 CLUSTER

Survey Area: AF Survey Unit: 771074 Classification: 1
Building: 771
Survey Unit Description: First floor (east side, southend)

Total Floor Area: 593 sq. m Total Area: 1606 sq. m Grid Size: 4m x 4m

SURVEY UNIT 771074 - MAP 1 OF 3

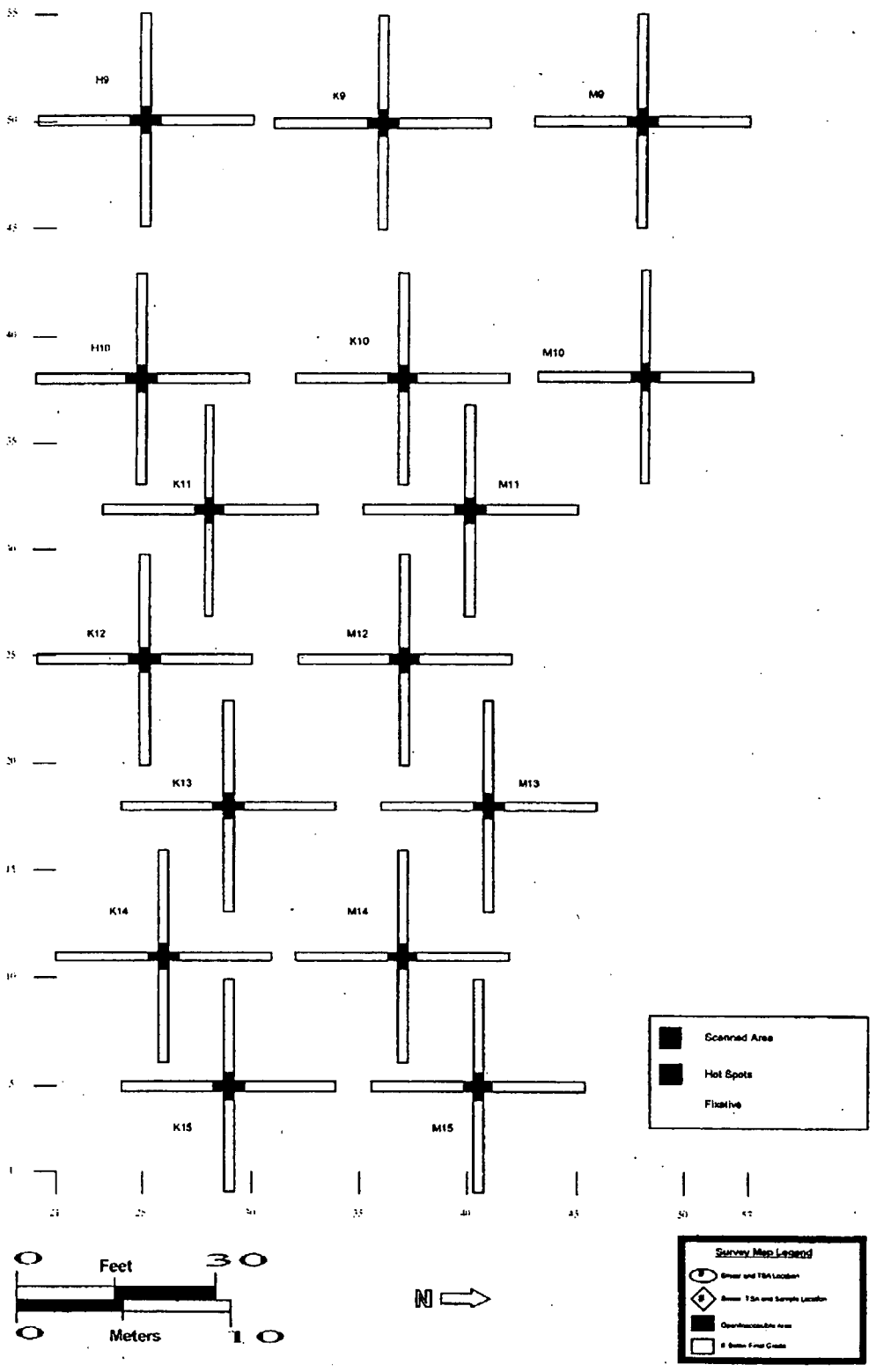


RADIOLOGICAL CLOSEOUT SURVEY FOR THE 771 CLUSTER

Survey Area: AF Survey Unit: 771074 Classification: 1
Building: 771
Survey Unit Description: First floor (east side, south end)

Total Floor Area: 593 sq. m Total Area: 1606 sq. m Grid Size: 4m x 4m

SURVEY UNIT 771074 - MAP 2 OF 3



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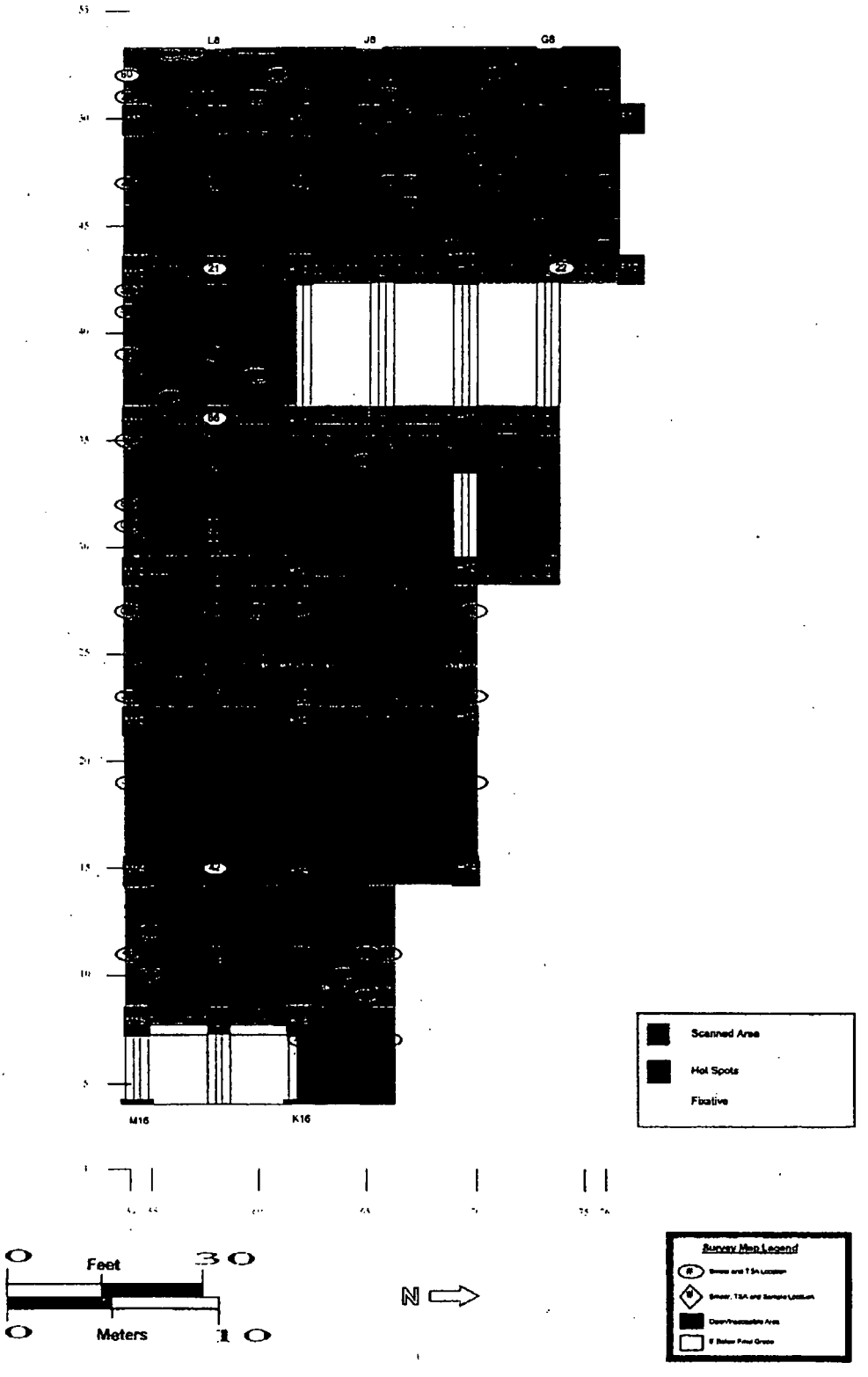
RADIOLOGICAL CLOSEOUT SURVEY FOR THE 771 CLUSTER

Survey Area: AF Survey Unit: 771074 Classification: 1
Building: 771
Survey Unit Description: First floor (east side, south end)

Total Floor Area: 593 sq. m Total Area: 1606 sq. m Grid Size: 4m x 4m

SURVEY UNIT 771074 - MAP 3 OF 3



ATTACHMENT C

Survey Unit 771075
Radiological Data Summary and Survey Map

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Rocky Flats Environmental Technology Site
Final Radiological Survey Summary Results

Total Surface Activity Measurements

Nbr Random Measurements Required: 175 | Nbr Biased Measurements Required: 0 | Nbr QC Required: 9

Nbr Random Measurements Performed: 175 | Nbr Biased Measurements Performed: 0 | Nbr QC Performed: 9

Alpha

Maximum:	76.0 dpm/100cm²
Minimum:	-15.6 dpm/100cm²
Mean:	23.0 dpm/100cm²
Standard Deviation:	18.2
QC Maximum:	41.6 dpm/100cm²
QC Minimum:	-6.2 dpm/100cm²
QC Mean:	18.8 dpm/100cm²
Transuranic DCGLw:	100.0 dpm/100cm²
Transuranic DCGLemc:	300.0 dpm/100cm²

Removable Surface Activity Measurements

Nbr Random Measurements Required: 175 | Nbr Biased Measurements Required: 0

Nbr Random Measurements Performed: 175 | Nbr Biased Measurements Performed: 0

Alpha

Maximum:	6.0 dpm/100cm²
Minimum:	-1.5 dpm/100cm²
Mean:	0.3 dpm/100cm²
Standard Deviation:	1.5
Transuranic DCGLw:	20.0 dpm/100cm²

Media Sample Results

Nbr Random Required: 0 | Nbr Biased Required: 0

Nbr Random Collected: 0 | Nbr Biased Collected: 0

Conclusion - A comparison of the random, biased and QC measurement results against the PDSP Table 7-1 Surface Contamination Guideline limits was conducted; the comparison demonstrates that this survey unit passes the criterion specified in the PDSP.

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Instrument Data Sheet

Inst/RCT Number	RCT ID	Analysis Date	Instr Model	Instru S/N	Probe Type	Calibration Due Dt	Instru Efficiency		A-Priori MDA (dpm/100cm²)		Survey Type
							Alpha	Beta	Alpha	Beta	
1	515011	08/23/04	Electra	390	DP-6	01/31/05	0.215	NA	48.0	NA	T
2	703970	08/23/04	Electra	1262	DP-6	11/24/04	0.232	NA	48.0	NA	T
3	513474	08/24/04	Electra	390	DP-6	01/31/04	0.215	NA	48.0	NA	T
4	513474	08/24/04	Electra	1551	DP-6	12/21/04	0.224	NA	48.0	NA	Q
5	712563	08/24/04	Electra	1262	DP-6	11/24/04	0.232	NA	48.0	NA	T
6	712563	08/25/04	Electra	1262	DP-6	11/24/04	0.232	NA	48.0	NA	T
7	702353	08/26/04	Electra	2385	DP-6	12/01/04	0.220	NA	48.0	NA	T
8	703970	08/26/04	Electra	1262	DP-6	11/24/04	0.232	NA	48.0	NA	T
9	513474	08/26/04	Electra	1551	DP-6	12/21/04	0.224	NA	48.0	NA	T
10	541020	08/26/04	Electra	2380	DP-6	01/24/05	0.213	NA	48.0	NA	T
11	701841	08/26/04	Electra	390	DP-6	01/31/05	0.215	NA	48.0	NA	T
12	513474	08/25/04	Electra	390	DP-6	01/31/05	0.215	NA	48.0	NA	T
23	703970	08/25/04	SAC-4	1178	NA	09/17/04	0.333	NA	10.0	10.0	R
24	703970	08/25/04	SAC-4	1410	NA	10/13/04	0.333	NA	10.0	10.0	R
25	703970	08/25/04	SAC-4	1491	NA	09/17/04	0.333	NA	10.0	10.0	R
26	703970	08/25/04	SAC-4	1354	NA	09/18/04	0.333	NA	10.0	10.0	R
27	703970	08/25/04	SAC-4	1185	NA	01/27/05	0.333	NA	10.0	10.0	R
30	515011	08/23/04	SAC-4	1178	NA	09/17/04	0.333	NA	10.0	10.0	R
31	515011	08/23/04	SAC-4	1410	NA	10/13/04	0.333	NA	10.0	10.0	R
32	515011	08/23/04	SAC-4	1491	NA	09/17/04	0.333	NA	10.0	10.0	R
33	515011	08/23/04	SAC-4	1354	NA	09/18/04	0.333	NA	10.0	10.0	R
34	515011	08/23/04	SAC-4	1185	NA	01/27/05	0.333	NA	10.0	10.0	R
36	702353	08/26/04	SAC-4	1410	NA	10/13/04	0.333	NA	10.0	10.0	R
37	702353	08/26/04	SAC-4	1491	NA	09/17/04	0.333	NA	10.0	10.0	R
38	702353	08/26/04	SAC-4	1354	NA	09/18/04	0.333	NA	10.0	10.0	R
39	515011	08/26/04	SAC-4	1185	NA	01/27/05	0.333	NA	10.0	10.0	R
44	541020	08/27/04	Electra	1551	DP-6	12/21/04	0.224	NA	48.0	NA	T

Survey Types: T = Total Surface Activity, Q = TSA QC, S = Scan, R = Removable Surface Activity, I = Investigation

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N001	23	2.4	N/A	
771075PRP-N002	24	-0.3	N/A	
771075PRP-N003	25	2.4	N/A	
771075PRP-N004	26	1.2	N/A	
771075PRP-N005	27	-0.9	N/A	
771075PRP-N006	23	-0.6	N/A	
771075PRP-N007	24	-0.3	N/A	
771075PRP-N008	25	0.9	N/A	
771075PRP-N009	26	2.7	N/A	
771075PRP-N010	27	0.6	N/A	
771075PRP-N011	23	5.4	N/A	
771075PRP-N012	24	2.7	N/A	
771075PRP-N013	25	-0.6	N/A	
771075PRP-N014	26	-0.3	N/A	
771075PRP-N015	27	-0.9	N/A	
771075PRP-N016	23	3.9	N/A	
771075PRP-N017	24	1.2	N/A	
771075PRP-N018	25	-0.6	N/A	
771075PRP-N019	26	2.7	N/A	
771075PRP-N020	27	2.1	N/A	
771075PRP-N021	23	2.4	N/A	
771075PRP-N022	24	-0.3	N/A	
771075PRP-N023	25	2.4	N/A	
771075PRP-N024	26	-0.3	N/A	
771075PRP-N025	27	0.6	N/A	
771075PRP-N026	23	3.9	N/A	
771075PRP-N027	24	-0.3	N/A	
771075PRP-N028	25	-0.6	N/A	
771075PRP-N029	26	1.2	N/A	

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Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N030	27	-0.9	N/A	
771075PRP-N031	38	-1.2	N/A	
771075PRP-N032	39	-0.9	N/A	
771075PRP-N033	36	-1.5	N/A	
771075PRP-N034	37	-1.2	N/A	
771075PRP-N035	38	-1.2	N/A	
771075PRP-N036	39	-0.9	N/A	
771075PRP-N037	36	-1.5	N/A	
771075PRP-N038	37	-1.2	N/A	
771075PRP-N039	36	-1.5	N/A	
771075PRP-N040	38	-1.2	N/A	
771075PRP-N041	39	-0.9	N/A	
771075PRP-N042	36	-1.5	N/A	
771075PRP-N043	37	-1.2	N/A	
771075PRP-N044	38	-1.2	N/A	
771075PRP-N045	39	-0.9	N/A	
771075PRP-N046	36	0.0	N/A	
771075PRP-N047	37	0.3	N/A	
771075PRP-N048	38	-1.2	N/A	
771075PRP-N049	36	0.0	N/A	
771075PRP-N050	37	-1.2	N/A	
771075PRP-N051	38	0.3	N/A	
771075PRP-N052	36	-1.5	N/A	
771075PRP-N053	37	0.3	N/A	
771075PRP-N054	38	-1.2	N/A	
771075PRP-N055	36	0.0	N/A	
771075PRP-N056	37	0.3	N/A	
771075PRP-N057	38	-1.2	N/A	
771075PRP-N058	36	-1.5	N/A	

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N059	37	-1.2	N/A	
771075PRP-N060	38	0.3	N/A	
771075PRP-N061	30	0.0	N/A	
771075PRP-N062	31	0.9	N/A	
771075PRP-N063	32	2.4	N/A	
771075PRP-N064	33	0.6	N/A	
771075PRP-N065	34	3.6	N/A	
771075PRP-N066	30	3.0	N/A	
771075PRP-N067	31	0.9	N/A	
771075PRP-N068	32	-0.6	N/A	
771075PRP-N069	33	0.6	N/A	
771075PRP-N070	34	2.1	N/A	
771075PRP-N071	30	0.0	N/A	
771075PRP-N072	31	0.9	N/A	
771075PRP-N073	32	-0.6	N/A	
771075PRP-N074	33	0.6	N/A	
771075PRP-N075	34	-0.9	N/A	
771075PRP-N076	30	0.0	N/A	
771075PRP-N077	31	0.9	N/A	
771075PRP-N078	32	-0.6	N/A	
771075PRP-N079	33	2.1	N/A	
771075PRP-N080	34	2.1	N/A	
771075PRP-N081	30	0.0	N/A	
771075PRP-N082	31	-0.6	N/A	
771075PRP-N083	32	-0.6	N/A	
771075PRP-N084	33	-0.9	N/A	
771075PRP-N085	34	-0.9	N/A	
771075PRP-N086	30	1.5	N/A	
771075PRP-N087	31	0.9	N/A	

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N088	32	0.9	N/A	
771075PRP-N089	33	-0.9	N/A	
771075PRP-N090	34	0.6	N/A	
771075PRP-N091	24	-0.3	N/A	
771075PRP-N092	25	-0.6	N/A	
771075PRP-N093	26	2.7	N/A	
771075PRP-N094	27	2.1	N/A	
771075PRP-N095	24	-0.3	N/A	
771075PRP-N096	25	-0.6	N/A	
771075PRP-N097	26	-0.3	N/A	
771075PRP-N098	37	1.8	N/A	
771075PRP-N099	24	2.7	N/A	
771075PRP-N100	25	0.9	N/A	
771075PRP-N101	26	-0.3	N/A	
771075PRP-N102	27	3.6	N/A	
771075PRP-N103	24	-0.3	N/A	
771075PRP-N104	25	-0.6	N/A	
771075PRP-N105	26	-0.3	N/A	
771075PRP-N106	27	2.1	N/A	
771075PRP-N107	24	-0.3	N/A	
771075PRP-N108	25	-0.6	N/A	
771075PRP-N109	38	3.3	N/A	
771075PRP-N110	27	-0.9	N/A	
771075PRP-N111	24	1.2	N/A	
771075PRP-N112	25	-0.6	N/A	
771075PRP-N113	26	1.2	N/A	
771075PRP-N114	27	0.6	N/A	
771075PRP-N115	24	-0.3	N/A	
771075PRP-N116	25	0.9	N/A	

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N117	26	1.2	N/A	
771075PRP-N118	27	-0.9	N/A	
771075PRP-N119	24	-0.3	N/A	
771075PRP-N120	25	-0.6	N/A	
771075PRP-N121	39	0.6	N/A	
771075PRP-N122	36	-1.5	N/A	
771075PRP-N123	37	1.8	N/A	
771075PRP-N124	38	-1.2	N/A	
771075PRP-N125	39	-0.9	N/A	
771075PRP-N126	36	-1.5	N/A	
771075PRP-N127	37	-1.2	N/A	
771075PRP-N128	38	-1.2	N/A	
771075PRP-N129	39	-0.9	N/A	
771075PRP-N130	36	0.0	N/A	
771075PRP-N131	37	1.8	N/A	
771075PRP-N132	38	-1.2	N/A	
771075PRP-N133	39	2.1	N/A	
771075PRP-N134	36	-1.5	N/A	
771075PRP-N135	37	0.3	N/A	
771075PRP-N136	36	-1.5	N/A	
771075PRP-N137	37	0.3	N/A	
771075PRP-N138	38	-1.2	N/A	
771075PRP-N139	39	0.6	N/A	
771075PRP-N140	36	-1.5	N/A	
771075PRP-N141	37	-1.2	N/A	
771075PRP-N142	38	-1.2	N/A	
771075PRP-N143	39	0.6	N/A	
771075PRP-N144	36	1.5	N/A	
771075PRP-N145	38	1.8	N/A	

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Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N146	38	-1.2	N/A	
771075PRP-N147	39	0.6	N/A	
771075PRP-N148	36	-1.5	N/A	
771075PRP-N149	37	1.8	N/A	
771075PRP-N150	38	0.3	N/A	
771075PRP-N151	30	0.0	N/A	
771075PRP-N152	30	1.5	N/A	
771075PRP-N153	31	-0.6	N/A	
771075PRP-N154	32	3.9	N/A	
771075PRP-N155	33	0.6	N/A	
771075PRP-N156	34	0.6	N/A	
771075PRP-N157	30	6.0	N/A	
771075PRP-N158	31	2.4	N/A	
771075PRP-N159	32	3.9	N/A	
771075PRP-N160	33	-0.9	N/A	
771075PRP-N161	34	0.6	N/A	
771075PRP-N162	30	3.0	N/A	
771075PRP-N163	31	0.9	N/A	
771075PRP-N164	32	-0.6	N/A	
771075PRP-N165	33	-0.9	N/A	
771075PRP-N166	34	-0.9	N/A	
771075PRP-N167	30	-1.5	N/A	
771075PRP-N168	31	0.9	N/A	
771075PRP-N169	32	2.4	N/A	
771075PRP-N170	33	-0.9	N/A	
771075PRP-N171	31	0.9	N/A	
771075PRP-N172	34	-0.9	N/A	
771075PRP-N173	32	-0.6	N/A	
771075PRP-N174	30	3.0	N/A	

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N175	31	0.9	N/A	

Comments:

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N001	2	-1.6	N/A	
771075PRP-N002	2	7.1	N/A	
771075PRP-N003	2	-1.6	N/A	
771075PRP-N004	2	7.1	N/A	
771075PRP-N005	2	61.8	N/A	
771075PRP-N006	2	67.4	N/A	
771075PRP-N007	2	29.9	N/A	
771075PRP-N008	2	29.9	N/A	
771075PRP-N009	2	24.3	N/A	
771075PRP-N010	2	27.3	N/A	
771075PRP-N011	2	18.7	N/A	
771075PRP-N012	2	55.8	N/A	
771075PRP-N013	2	55.8	N/A	
771075PRP-N014	2	41.5	N/A	
771075PRP-N015	2	7.1	N/A	
771075PRP-N016	2	35.9	N/A	
771075PRP-N017	2	44.6	N/A	
771075PRP-N018	2	41.5	N/A	
771075PRP-N019	2	76.0	N/A	
771075PRP-N020	2	12.7	N/A	
771075PRP-N021	2	58.8	N/A	
771075PRP-N022	2	-4.6	N/A	
771075PRP-N023	2	18.7	N/A	
771075PRP-N024	2	10.1	N/A	
771075PRP-N025	2	24.3	N/A	
771075PRP-N026	2	4.0	N/A	
771075PRP-N027	2	32.9	N/A	

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N028	2	-7.2	N/A	
771075PRP-N029	2	4.0	N/A	
771075PRP-N030	2	15.7	N/A	
771075PRP-N031	11	15.2	N/A	
771075PRP-N032	11	-0.2	N/A	
771075PRP-N033	11	31.0	N/A	
771075PRP-N034	11	9.1	N/A	
771075PRP-N035	11	24.5	N/A	
771075PRP-N036	11	15.2	N/A	
771075PRP-N037	11	37.0	N/A	
771075PRP-N038	11	27.7	N/A	
771075PRP-N039	8	35.9	N/A	
771075PRP-N040	11	37.0	N/A	
771075PRP-N041	11	-0.2	N/A	
771075PRP-N042	11	9.1	N/A	
771075PRP-N043	44	6.6	N/A	
771075PRP-N044	11	3.1	N/A	
771075PRP-N045	11	1.2	N/A	
771075PRP-N046	7	2.6	N/A	
771075PRP-N047	44	37.9	N/A	
771075PRP-N048	44	4.9	N/A	
771075PRP-N049	7	-15.6	N/A	
771075PRP-N050	44	4.9	N/A	
771075PRP-N051	7	25.3	N/A	
771075PRP-N052	7	53.9	N/A	
771075PRP-N053	7	5.3	N/A	
771075PRP-N054	44	4.9	N/A	

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Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N055	7	75.3	N/A	
771075PRP-N056	7	32.6	N/A	
771075PRP-N057	44	22.7	N/A	
771075PRP-N058	44	-0.9	N/A	
771075PRP-N059	44	20.0	N/A	
771075PRP-N060	44	3.5	N/A	
771075PRP-N061	12	9.1	N/A	
771075QRP-N062	4	-6.2	N/A	
771075PRP-N062	12	27.7	N/A	
771075QRP-N063	4	14.8	N/A	
771075PRP-N063	12	27.7	N/A	
771075PRP-N064	12	5.9	N/A	
771075PRP-N065	12	12.4	N/A	
771075PRP-N066	12	33.8	N/A	
771075PRP-N067	12	3.1	N/A	
771075PRP-N068	12	27.7	N/A	
771075PRP-N069	12	40.3	N/A	
771075PRP-N070	12	31.0	N/A	
771075PRP-N071	12	27.7	N/A	
771075PRP-N072	12	15.2	N/A	
771075PRP-N073	12	-9.5	N/A	
771075PRP-N074	12	3.1	N/A	
771075PRP-N075	12	33.8	N/A	
771075QRP-N076	4	17.9	N/A	
771075PRP-N076	12	9.1	N/A	
771075PRP-N077	12	18.4	N/A	
771075QRP-N078	4	9.0	N/A	

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N078	12	5.9	N/A	
771075PRP-N079	12	40.3	N/A	
771075PRP-N080	12	43.1	N/A	
771075PRP-N081	12	-3.5	N/A	
771075PRP-N082	12	5.9	N/A	
771075PRP-N083	12	15.2	N/A	
771075PRP-N084	12	27.7	N/A	
771075PRP-N085	12	31.0	N/A	
771075PRP-N086	12	5.9	N/A	
771075QRP-N087	4	41.6	N/A	
771075PRP-N087	12	15.2	N/A	
771075PRP-N088	12	33.8	N/A	
771075PRP-N089	12	18.4	N/A	
771075PRP-N090	12	15.2	N/A	
771075PRP-N091	2	29.9	N/A	
771075PRP-N092	2	32.9	N/A	
771075PRP-N093	6	53.2	N/A	
771075PRP-N094	2	-1.6	N/A	
771075PRP-N095	2	58.8	N/A	
771075PRP-N096	5	35.9	N/A	
771075PRP-N097	5	41.5	N/A	
771075PRP-N098	8	29.9	N/A	
771075PRP-N099	5	10.1	N/A	
771075PRP-N100	6	21.3	N/A	
771075PRP-N101	5	35.9	N/A	
771075PRP-N102	5	44.6	N/A	
771075PRP-N103	5	10.1	N/A	

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N104	5	35.9	N/A	
771075PRP-N105	5	29.9	N/A	
771075PRP-N106	5	27.3	N/A	
771075PRP-N107	5	10.1	N/A	
771075PRP-N108	5	35.9	N/A	
771075PRP-N109	8	21.3	N/A	
771075PRP-N110	5	21.3	N/A	
771075PRP-N111	5	21.3	N/A	
771075PRP-N112	5	-7.2	N/A	
771075PRP-N113	5	7.1	N/A	
771075PRP-N114	5	27.3	N/A	
771075PRP-N115	5	18.7	N/A	
771075PRP-N116	5	4.0	N/A	
771075PRP-N117	6	18.7	N/A	
771075PRP-N118	6	18.7	N/A	
771075PRP-N119	6	7.1	N/A	
771075PRP-N120	6	12.7	N/A	
771075PRP-N121	6	12.7	N/A	
771075PRP-N122	6	18.7	N/A	
771075PRP-N123	6	18.7	N/A	
771075PRP-N124	6	1.5	N/A	
771075PRP-N125	8	41.5	N/A	
771075PRP-N126	8	35.9	N/A	
771075PRP-N127	8	76.0	N/A	
771075PRP-N128	8	55.8	N/A	
771075PRP-N129	8	15.7	N/A	
771075PRP-N130	8	35.9	N/A	

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N131	8	-7.2	N/A	
771075PRP-N132	8	21.3	N/A	
771075PRP-N133	8	47.1	N/A	
771075PRP-N134	10	-0.0	N/A	
771075PRP-N135	8	12.7	N/A	
771075PRP-N136	9	16.9	N/A	
771075PRP-N137	9	31.6	N/A	
771075PRP-N138	9	22.7	N/A	
771075PRP-N139	9	46.8	N/A	
771075PRP-N140	9	6.6	N/A	
771075PRP-N141	9	25.8	N/A	
771075PRP-N142	9	20.0	N/A	
771075PRP-N143	9	20.0	N/A	
771075PRP-N144	9	4.9	N/A	
771075PRP-N145	8	18.7	N/A	
771075PRP-N146	9	29.0	N/A	
771075PRP-N147	9	8.0	N/A	
771075PRP-N148	9	8.0	N/A	
771075PRP-N149	9	34.8	N/A	
771075PRP-N150	9	16.9	N/A	
771075PRP-N151	3	43.1	N/A	
771075PRP-N152	3	12.4	N/A	
771075PRP-N153	3	-3.5	N/A	
771075PRP-N154	3	5.9	N/A	
771075QRP-N154	4	20.6	N/A	
771075PRP-N155	3	15.2	N/A	
771075QRP-N155	4	41.6	N/A	

Survey Area: AF	Survey Unit: 771075	Building: 771

Description: First Floor (east end, north side)

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771075PRP-N156	3	46.3	N/A	
771075QRP-N156	4	23.7	N/A	
771075PRP-N157	3	27.7	N/A	
771075PRP-N158	3	33.8	N/A	
771075PRP-N159	3	12.4	N/A	
771075PRP-N160	3	18.4	N/A	
771075PRP-N161	3	15.2	N/A	
771075PRP-N162	3	27.7	N/A	
771075QRP-N162	4	5.9	N/A	
771075PRP-N163	3	24.5	N/A	
771075PRP-N164	3	49.6	N/A	
771075PRP-N165	3	74.2	N/A	
771075PRP-N166	3	12.4	N/A	
771075PRP-N167	3	18.4	N/A	
771075PRP-N168	3	33.8	N/A	
771075PRP-N169	3	43.1	N/A	
771075PRP-N170	3	33.8	N/A	
771075PRP-N171	3	15.2	N/A	
771075PRP-N172	12	33.8	N/A	
771075PRP-N173	3	49.6	N/A	
771075PRP-N174	12	31.0	N/A	
771075PRP-N175	3	40.3	N/A	

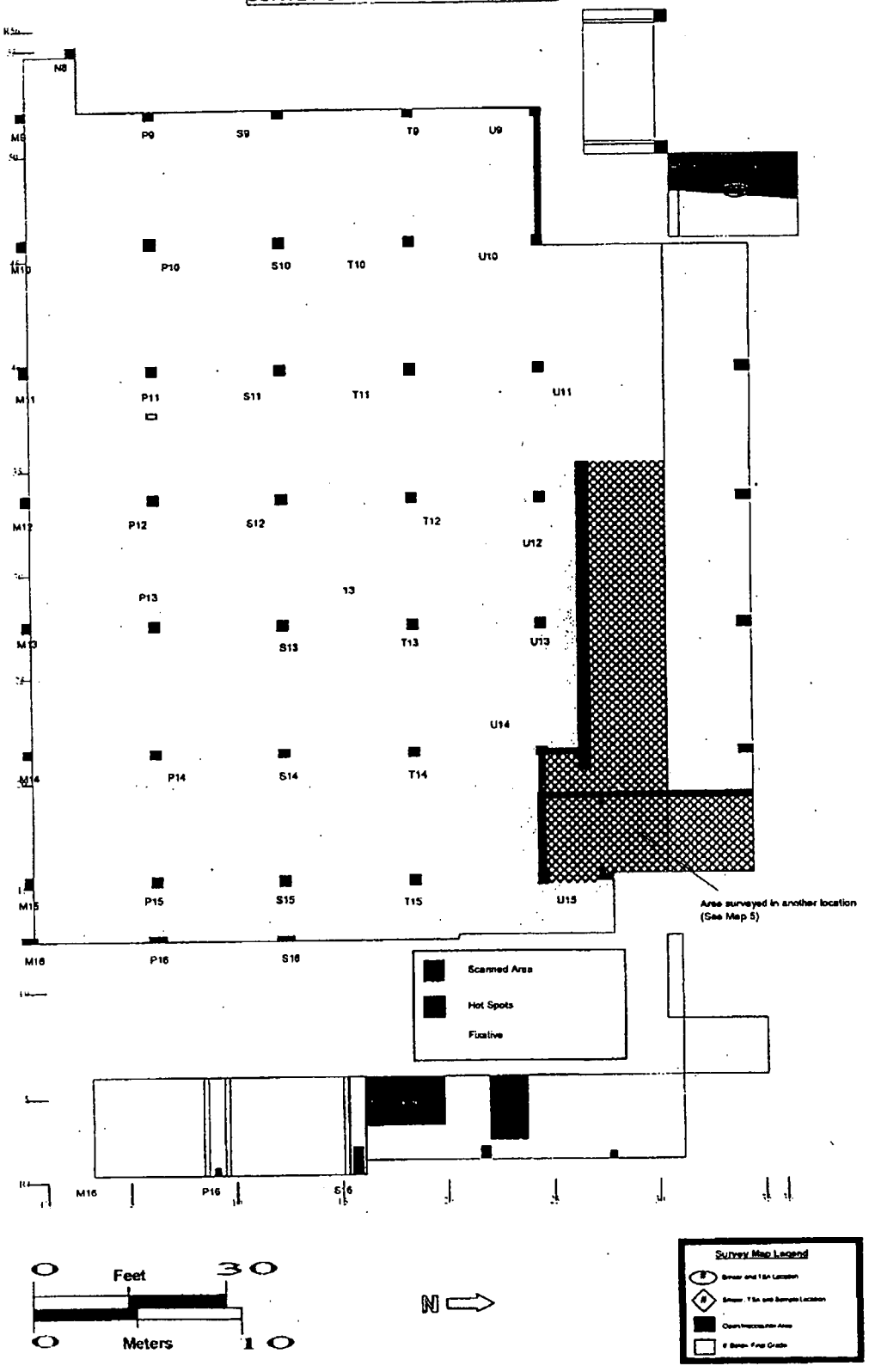
Comments:

RADIOLOGICAL CLOSEOUT SURVEY FOR THE 771 CLUSTER

Survey Area: AF Survey Unit: 771075 Classification: 1
Building: 771
Survey Unit Description: First floor (east end, north side)

Total Floor Area: 1161 sq. m Total Area: 3542 sq. m Grid Size: 4m x 4m

SURVEY UNIT 771075 - MAP 1 OF 5



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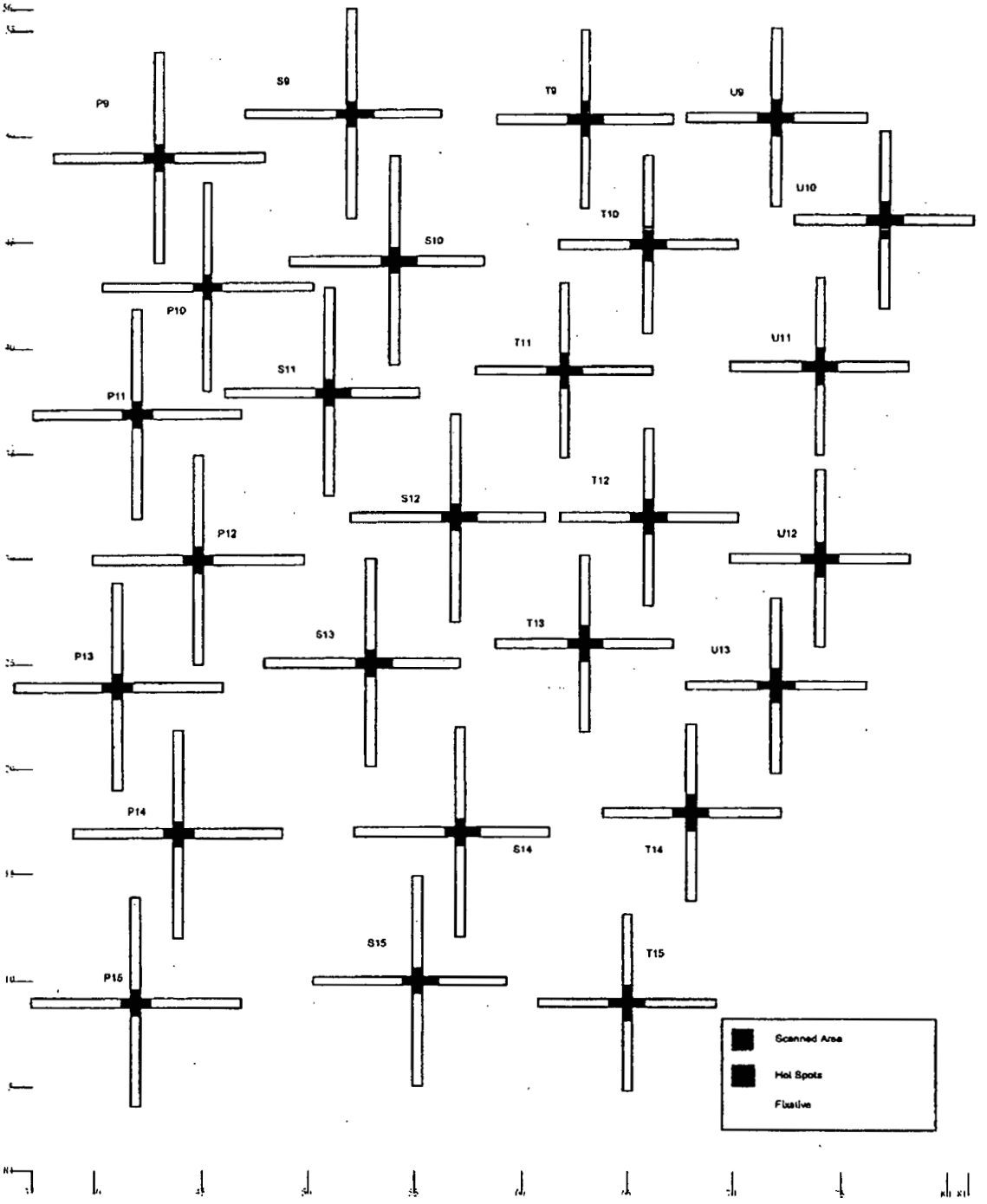
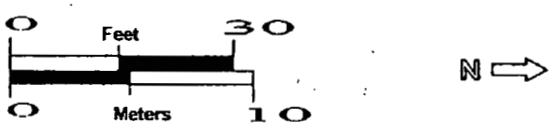
RADIOLOGICAL CLOSEOUT SURVEY FOR THE 771 CLUSTER

Survey Area: AF Survey Unit: 771075 Classification: 1
Building: 771
Survey Unit Description: First floor (northeast side)

Total Floor Area: 1161 sq. m Total Area: 3542 sq. m Grid Size: 4m x 4m

SURVEY UNIT 771075 - MAP 2 OF 5





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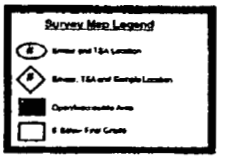
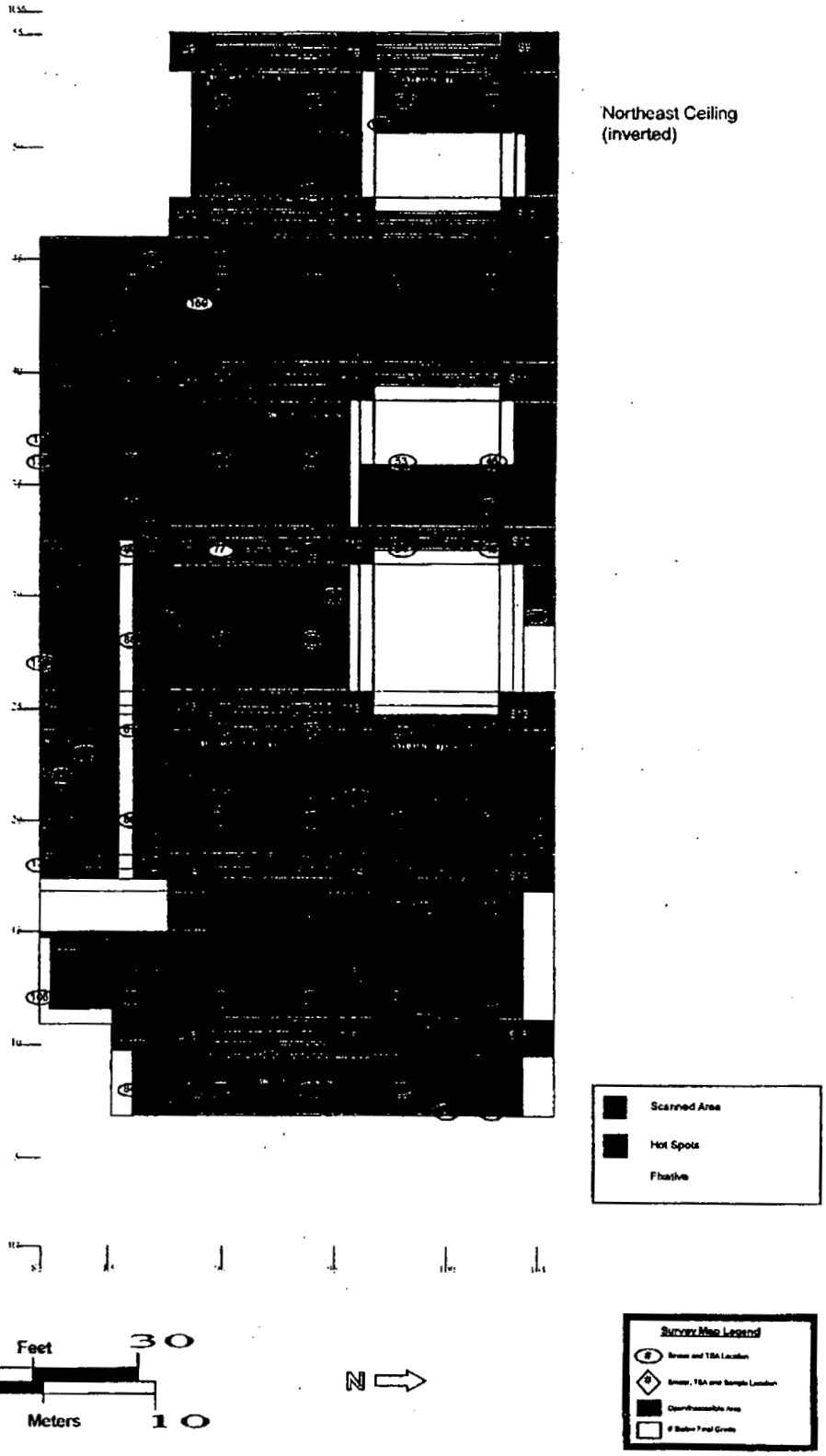


RADIOLOGICAL CLOSEOUT SURVEY FOR THE 771 CLUSTER

Survey Area: AF **Survey Unit:** 771075 **Classification:** 1
Building: 771
Survey Unit Description: First floor (east end, north side)

Total Floor Area: 1161 sq. m **Total Area:** 3542 sq. m **Grid Size:** 4m x 4m

SURVEY UNIT 771075 - MAP 3 OF 5



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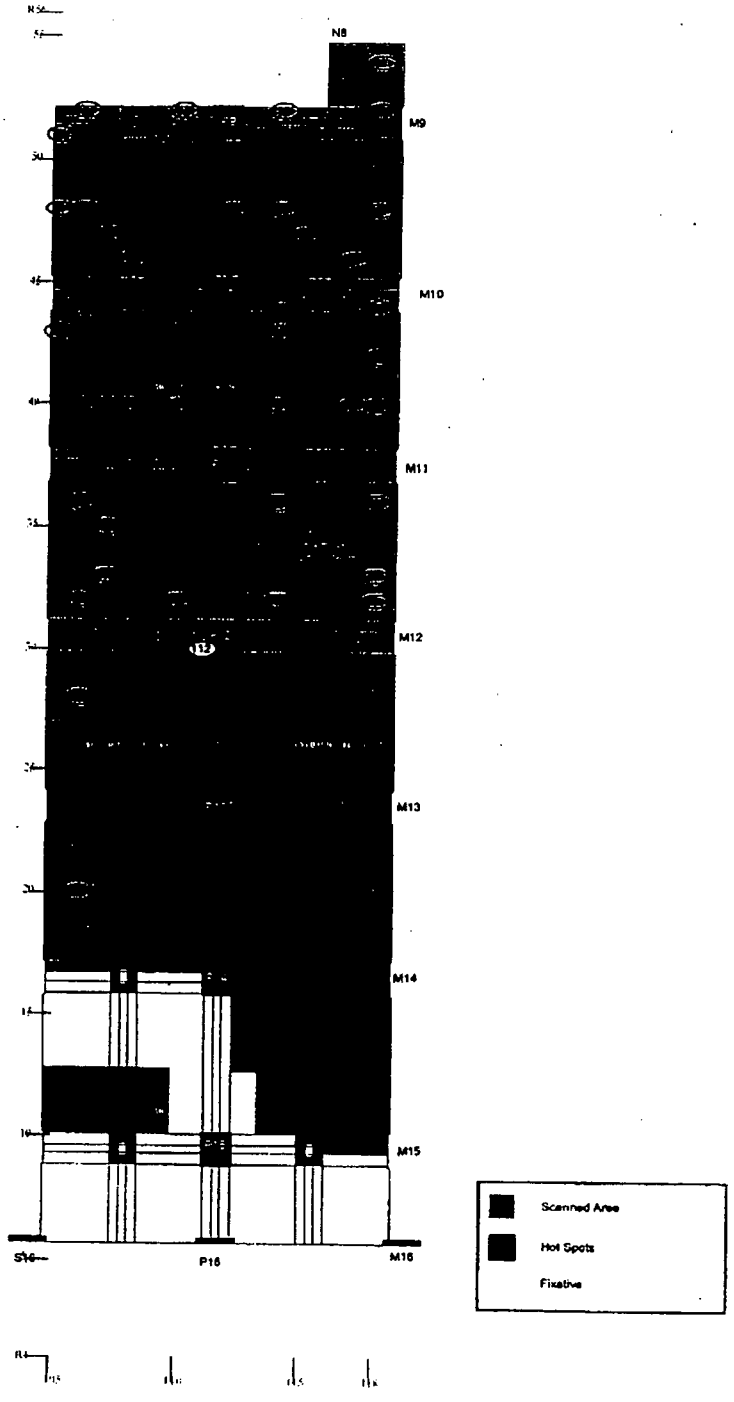
RADIOLOGICAL CLOSEOUT SURVEY FOR THE 771 CLUSTER

Survey Area: AF Survey Unit: 771075 Classification: 1
Building: 771
Survey Unit Description: First floor (east end, north side)

Total Floor Area: 1161 sq. m Total Area: 3542 sq. m Grid Size: 4m x 4m

SURVEY UNIT 771075 - MAP 4 OF 5

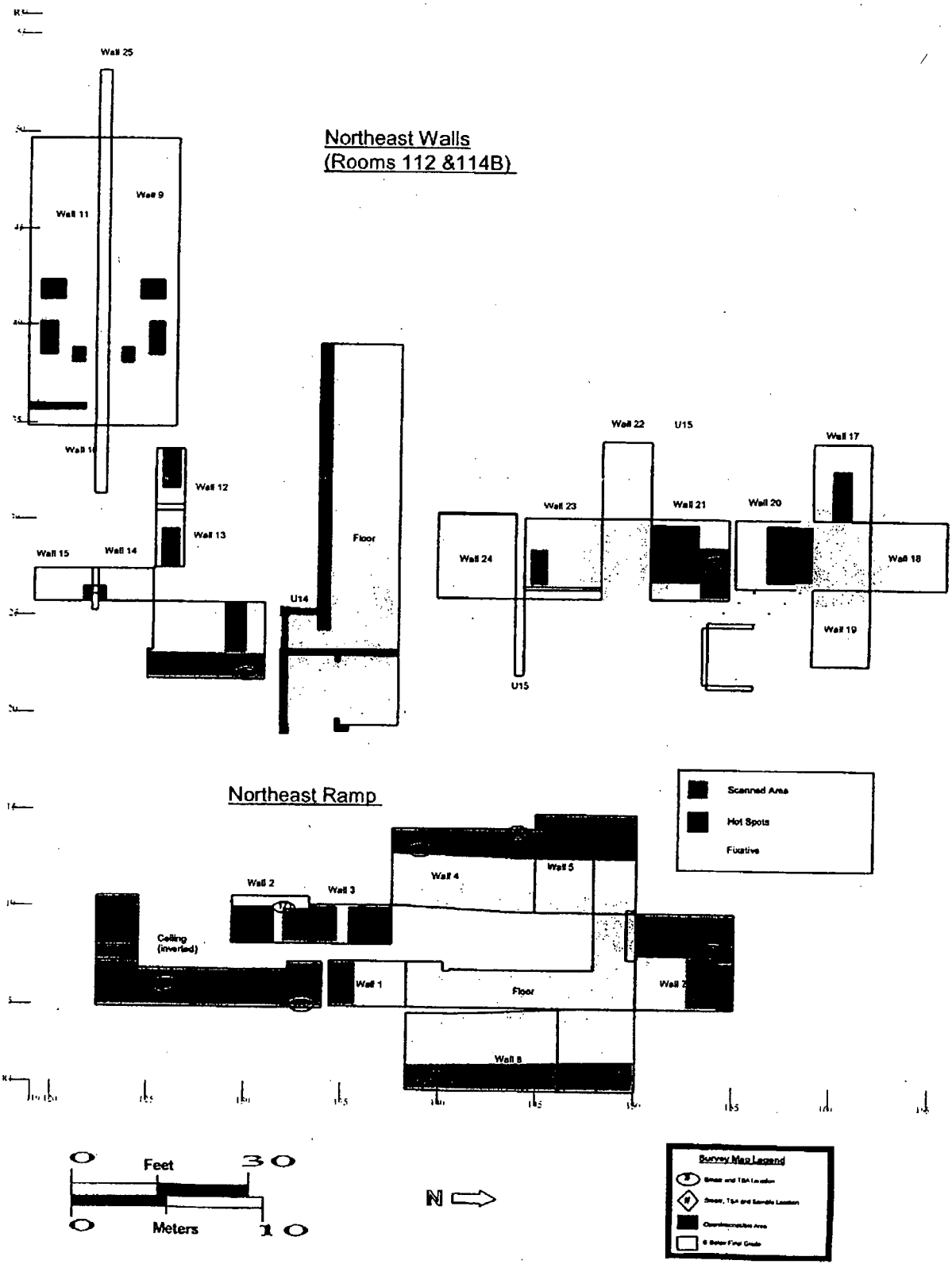


RADIOLOGICAL CLOSEOUT SURVEY FOR THE 771 CLUSTER

Survey Area: AF Survey Unit: 771075 Classification: 1
Building: 771
Survey Unit Description: First floor (east end, north side)

Total Floor Area: 1161 sq. m Total Area: 3542 sq. m Grid Size: 4m x 4m

SURVEY UNIT 771075 - MAP 5 OF 5



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ATTACHMENT D

Survey Unit 771088
Radiological Data Summary and Survey Map

Survey Area: AF	Survey Unit: 771088	Building: 771

Description: Stairwell #3

Rocky Flats Environmental Technology Site
Final Radiological Survey Summary Results

Total Surface Activity Measurements

Nbr Random Measurements Required: 15 | Nbr Biased Measurements Required: 0 | Nbr QC Required: 2

Nbr Random Measurements Performed: 15 | Nbr Biased Measurements Performed: 0 | Nbr QC Performed: 2

Alpha

Maximum:	29.7 dpm/100cm²
Minimum:	-4.3 dpm/100cm²
Mean:	10.8 dpm/100cm²
Standard Deviation:	11.3
QC Maximum:	20.7 dpm/100cm²
QC Minimum:	9.1 dpm/100cm²
QC Mean:	14.9 dpm/100cm²
Transuranic DCGLw:	100.0 dpm/100cm²
Transuranic DCGLemc:	300.0 dpm/100cm²

Removable Surface Activity Measurements

Nbr Random Measurements Required: 15 | Nbr Biased Measurements Required: 0

Nbr Random Measurements Performed: 15 | Nbr Biased Measurements Performed: 0

Alpha

Maximum:	2.4 dpm/100cm²
Minimum:	-0.9 dpm/100cm²
Mean:	0.2 dpm/100cm²
Standard Deviation:	1.1
Transuranic DCGLw:	20.0 dpm/100cm²

Media Sample Results

Nbr Random Required: 0 | Nbr Biased Required: 0

Nbr Random Collected: 0 | Nbr Biased Collected: 0

Conclusion - A comparison of the random, biased and QC measurement results against the PDSP Table 7-1 Surface Contamination Guideline limits was conducted; the comparison demonstrates that this survey unit passes the criterion specified in the PDSP.

Survey Area: AF	Survey Unit: 771088	Building: 771

Description: Stairwell #3

Instrument Data Sheet

Inst/RCT Number	RCT ID	Analysis Date	Instr Model	Instru S/N	Probe Type	Calibration Due Dt	Instru Efficiency		A-Priori MDA (dpm/100cm²)		Survey Type
							Alpha	Beta	Alpha	Beta	
2	513185	08/16/04	Electra	390	DP-6	01/13/05	0.215	NA	48.0	NA	T
3	514510	08/16/04	Electra	1551	DP-6	12/21/04	0.224	NA	48.0	NA	Q
4	514510	08/16/04	SAC-4	1178	NA	09/17/04	0.333	NA	10.0	10.0	R
5	514510	08/16/04	SAC-4	1410	NA	10/13/04	0.333	NA	10.0	10.0	R
6	514510	08/16/04	SAC-4	1491	NA	09/17/04	0.333	NA	10.0	10.0	R

Survey Types: T = Total Surface Activity, Q = TSA QC, S = Scan, R = Removable Surface Activity, I = Investigation

Survey Area: AF	Survey Unit: 771088	Building: 771

Description: Stairwell #3

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771088PRP-N001	4	0.6	N/A	
771088PRP-N002	5	-0.6	N/A	
771088PRP-N003	6	-0.6	N/A	
771088PRP-N004	4	0.6	N/A	
771088PRP-N005	5	-0.6	N/A	
771088PRP-N006	6	0.9	N/A	
771088PRP-N007	4	-0.9	N/A	
771088PRP-N008	5	-0.6	N/A	
771088PRP-N009	6	2.4	N/A	
771088PRP-N010	4	0.6	N/A	
771088PRP-N011	5	-0.6	N/A	
771088PRP-N012	6	-0.6	N/A	
771088PRP-N013	4	2.1	N/A	
771088PRP-N014	5	-0.6	N/A	
771088PRP-N015	6	0.9	N/A	

Comments:

Survey Area: AF	Survey Unit: 771088	Building: 771

Description: Stairwell #3

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
771088PRP-N001	2	9.7	N/A	
771088PRP-N002	2	23.6	N/A	
771088QRP-N002	3	9.1	N/A	
771088PRP-N003	2	-4.3	N/A	
771088PRP-N004	2	14.3	N/A	
771088PRP-N005	2	5.0	N/A	
771088PRP-N006	2	14.3	N/A	
771088PRP-N007	2	17.6	N/A	
771088PRP-N008	2	19.0	N/A	
771088PRP-N009	2	-4.3	N/A	
771088PRP-N010	2	-2.9	N/A	
771088PRP-N011	2	0.4	N/A	
771088PRP-N012	2	23.6	N/A	
771088PRP-N013	2	-1.0	N/A	
771088PRP-N014	2	29.7	N/A	
771088QRP-N014	3	20.7	N/A	
771088PRP-N015	2	17.6	N/A	

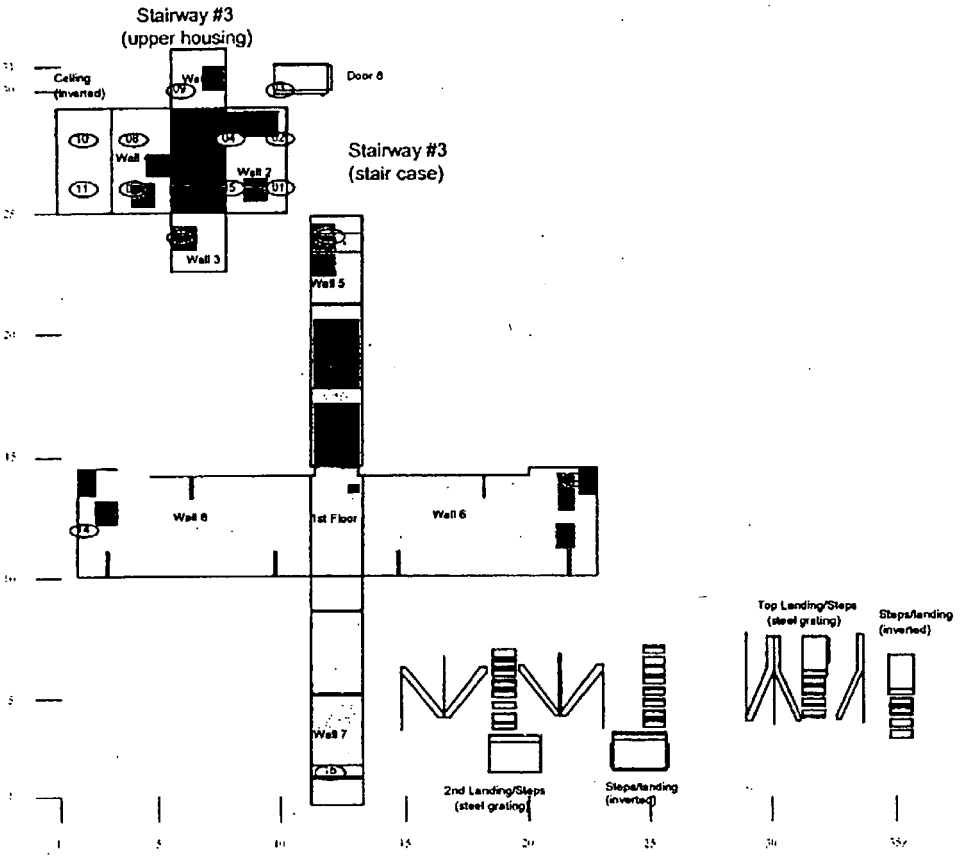
Comments:

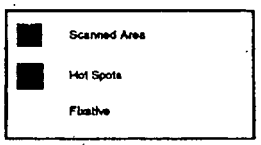
RADIOLOGICAL CLOSEOUT SURVEY FOR THE 771 CLUSTER

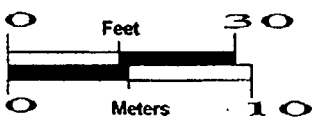
Survey Area: AF Survey Unit: 771088 Classification: 2
Building: 771
Survey Unit Description: Stairwell #3

Total Floor Area: 8 sq. m Total Area: 84 sq. m Grid Size: 2m x 2m

SURVEY UNIT 771088 - MAP 1 OF 1







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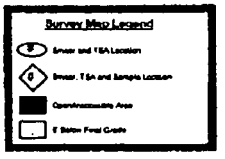


ATTACHMENT E

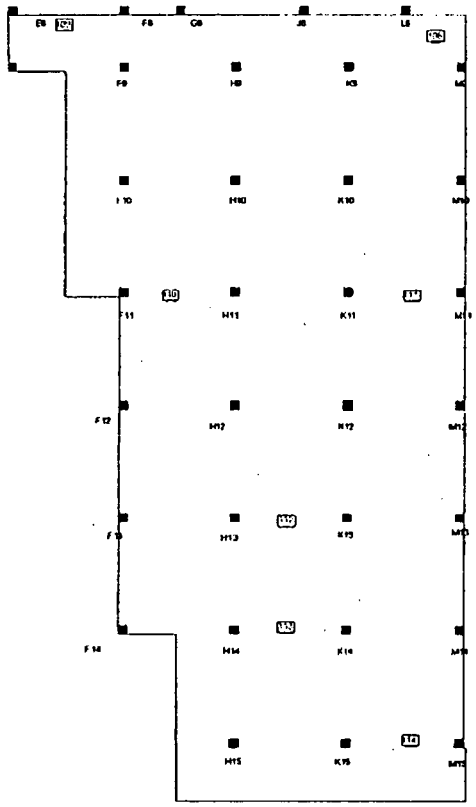
Chemical Data Summaries and Sample Maps

BERYLLIUM CHARACTERIZATION SURVEY FOR THE 771 CLUSTER

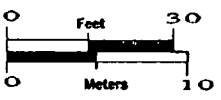
Survey Area: AF Survey Unit: 771074 Be Classification: NA
Building: 771
Survey Unit Description: First floor (Room 149)

Total Floor Area: 8879 sq. ft. Total Area: NA Grid Size: NA

SURVEY UNIT 771074 Be - MAP 1 OF 1



Sample location	Sample Number	Sample Result
108 thru 114	771-07-20-2004-76-108 thru 114	<0.1 ug/100 sq cm
	771-07-20-2004-76-1408 thru 1448	Blanks

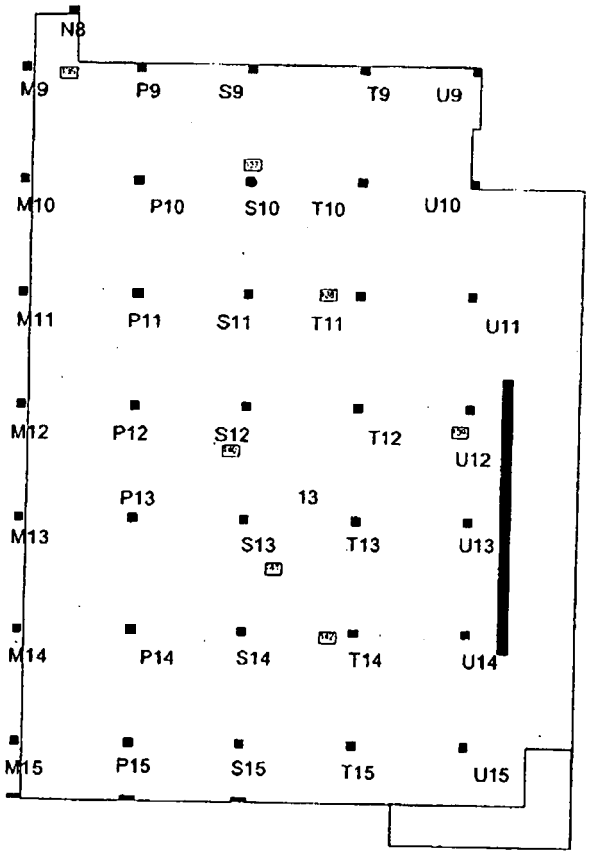


BERYLLIUM CHARACTERIZATION SURVEY FOR THE 771 CLUSTER

Survey Area: AF Survey Unit: 771075 Be Classification: NA
Building: 771
Survey Unit Description: First floor (Room 114)

Total Floor Area: 12764 sq. ft. Total Area: NA Grid Size: NA

SURVEY UNIT 771075 Be - MAP 1 OF 1



Sample location	Sample Number	Sample Result
136 thru 142	771-07-20-2004-76-136 thru 142	<0.1 ug/100 sq. cm
	771-07-20-2004-76-143B thru 144B	Blanks

0 Feet 30
0 Meters 10

N

Survey Map Legend

771	114	7/20/04	BE SWIPE TAKEN BETWEEN COLUMNS M9 & P9	SURFACE	771-07202004-76-136	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	114	7/20/04	BE SWIPE TAKEN WEST OF COLUMN S10	SURFACE	771-07202004-76-137	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	114	7/20/04	BE SWIPE TAKEN WEST OF COLUMN T11	SURFACE	771-07202004-76-138	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	114	7/20/04	BE SWIPE TAKEN SOUTH OF COLUMN U12	SURFACE	771-07202004-76-139	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	114	7/20/04	BE SWIPE TAKEN EAST OF COLUMN S12	SURFACE	771-07202004-76-140	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	114	7/20/04	BE SWIPE TAKEN EAST OF COLUMN S13	SURFACE	771-07202004-76-141	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	114	7/20/04	BE SWIPE TAKEN BETWEEN COLUMNS S14 &T14	SURFACE	771-07202004-76-142	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	149	7/20/04	BE SWIPE TAKEN WEST OF COLUMN M9 NORTH OF L8	SURFACE	771-07202004-76-108	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	149	7/20/04	BE SWIPE TAKEN BETWEEN COLUMNS E8 & F8	SURFACE	771-07202004-76-109	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2

771	149	7/20/04	BE SWIPE TAKEN BETWEEN COLUMNS F11 & H11	SURFACE	771-07202004-76-110	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	149	7/20/04	BE SWIPE TAKEN BETWEEN COLUMNS K11 & M11	SURFACE	771-07202004-76-111	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	149	7/20/04	BE SWIPE TAKEN BETWEEN COLUMNS H13 & K13	SURFACE	771-07202004-76-112	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	149	7/20/04	BE SWIPE TAKEN BETWEEN COLUMNS H14 & K14	SURFACE	771-07202004-76-113	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2
771	149	7/20/04	BE SWIPE TAKEN BETWEEN COLUMNS K15 & M15	SURFACE	771-07202004-76-114	BERYLLIUM AND BE COMPOUNDS (AS BE)	< 0.1000 _ UG/100CM2

ATTACHMENT F

Data Quality Assessment

DATA QUALITY ASSESSMENT (DQA)

VERIFICATION & VALIDATION OF RESULTS

V&V of the data confirm that appropriate quality controls are implemented throughout the sampling and analysis process, and that any substandard controls result in qualification or rejection of the data in question. The required quality controls and their implementation are summarized in a tabular, checklist format for each category of data – radiological surveys and chemical analyses (specifically beryllium).

DQA criteria and results are provided in a tabular format for each suite of surveys or chemical analyses performed; the radiological survey assessment is provided in Table E-1, and beryllium in E-2. A data completeness summary for all results is given in Table E-3. A data completeness summary for the radiological data representing areas greater than 6' below final grade is provided in Table E-4. These areas were characterized per the *Building 771/774 Closure Project Characterization Plan for Areas Greater than Six Feet Below Final Grade*, dated November 24, 2003 (refer to Attachment H).

All relevant Quality records supporting this report are maintained in the B771 Characterization Project Files. This report will be submitted to the CERCLA Administrative Record for permanent storage within 30 days of approval by the Regulators. All radiological data are organized into Survey Packages, which correlate to unique Survey Units. Chemical data are organized by RIN (Report Identification Number) and are traceable to the sample number and corresponding sample location.

Survey designs were implemented based on the transuranic limits used as DCGLs in the unrestricted release decision process. All survey results were evaluated against, and were less than the Transuranic $DCGL_w$ (100 dpm/100cm^2).

SUMMARY

In summary, the data presented in this report have been verified and validated relative to the quality requirements and project decisions as stated in the original DQOs. All data are useable based on qualifications stated herein and are considered satisfactory without qualification.

Based upon an independent review of the radiological data, it is determined that the original project DQOs satisfied site PDSP guidance. However, it should be noted that because portions of the facility exceed the DCGLs and shall be dispositioned as radiological waste, the original survey design was modified. When a randomly selected TSA/RSA location landed on a previously identified "hot-spot", the location was moved as close as possible to the original location within the square meter. When this was not

possible, a new random location was selected. All facility contamination levels were below applicable unrestricted release levels, except as noted in Tables E-3 and E-4. Minimum survey requirements were met, sampling/survey protocol was performed in accordance with applicable procedures, survey units were properly designed and bounded, and instrument performance and calibration were within acceptable limits.

Level 1 Isolation Controls have been implemented to prevent the inadvertent introduction of further contamination into the facility. On this basis, the B771 AF (1st Floor East Side) meets the RLCP and PDSP DQO criteria with the confidences stated herein.

Table E-1 V&V of Radiological Surveys – B771 AF (1st Floor East Side)

V&V CRITERIA, RADIOLGICAL SURVEYS		K-H RSP 16.00 Series MARSSIM (NUREG-1575)		
QUALITY REQUIREMENTS				
Parameters		Measure	Frequency	COMMENTS
ACCURACY	initial calibrations	80%<x<120 %	≥1	Calibration using Alpha Group procedure and approved technicians.
	daily source checks	80%<x<120 %	≥1/day	Performed daily/within range.
	local area background: Field	typically < 10 dpm	≥1/day	All local area backgrounds were within expected Ranges <10 cpm
PRECISION	field duplicate measurements for TSA	≥5% of real survey points	≥100% packages	N/A
REPRESENTATIVENESS	MARSSIM methodology: Survey Unit 771074, 771075, and 771088	statistical	NA	Random w/ statistical confidence. Some measurement locations were moved within the contiguous square meter when they landed on a previously identified "hot-spot". When this was not possible, a new random location was generated to replace the original location.
	Survey Maps	NA	NA	Random measurement locations controlled/mapped to ±1m. When this was not possible, a new random location was generated to replace the original location.
	Controlling Documents (Characterization Pkg; RSPs)	qualitative	NA	Refer to the Characterization Package (planning document) for field/sampling procedures (located in Project files); thorough documentation of the planning, sampling/analysis process, and data reduction into formats.
COMPARABILITY	units of measure	dpm/100cm^2	NA	Use of standardized engineering units in the reporting of measurement results.
COMPLETENESS	Plan vs. Actual surveys usable results vs. unusable	>95% >95%	NA	
SENSITIVITY	detection limits	TSA: ≤50 dpm/100cm^2 RA: ≤10 dpm/100cm^2	all measures	MDAs ≤ ½ DCGL$_w$ per MARSSIM guidelines.

Table E-2 V&V of Beryllium Results – B771 AF (1st Floor East Side)

V&V CRITERIA, CHEMICAL ANALYSES		DATA PACKAGE		
BERYLLIUM	Prep: NMAM 7300 METHOD: OSHA ID-125G	LAB --->	Johns Manville Corp. Denver, Co.	
QUALITY REQUIREMENTS		RIN ---->	RIN 771-07202004-76-108 to 114, and 136 to 142	
		Measure	Frequency	COMMENTS
ACCURACY	Calibrations Initial	linear calibration	≥1	No qualifications significant enough to change project decisions, i.e., classification of Type 3 facilities confirmed for radiological contamination. No Beryllium results above action level (0.2ug/100cm^2) or investigative level (0.1ug/100cm^2).
	Continuing	80%<%R<120%	≥1	
	LCS/MS	80%<%R<120%	≥1	
	Blanks - lab & field	<MDL	≥1	
	interference check std (ICP)	NA	NA	
PRECISION	Laboratory Control Sample Duplicate	80%<%R<120% (RPD<20%)	≥1	
	field duplicate	all results < RL	≥1	
REPRESENTATIVENESS	COC	Qualitative	NA	
	hold times/preservation	Qualitative	NA	
	Controlling Documents (Plans, Procedures, maps, etc.)	Qualitative	NA	
COMPARABILITY	measurement units	ug/100cm^2	NA	
COMPLETENESS	Plan vs. Actual samples usable results vs. unusable	>95% >95%	NA	
SENSITIVITY	detection limits	MDL of 0.10ug/100cm^2	all measures	

Table E-3 Data Completeness Summary (Areas within 6' of Final Grade) – B771 AF (1st Floor East Side)

ANALYTE	Building/Area /Unit	Sample Number Planned (Real & QC)[A]	Sample Number Taken (Real & QC)	Project Decisions (Conclusions) & Uncertainty	Comments (RIN, Analytical Method, Qualifications, etc.)
Beryllium	B771 AF 771075 (1st Floor North East)	7 biased (interior)	7 biased (interior)	No beryllium contamination found at any location, all results below the regulatory limit	OSHA ID-125G RIN 771-07202004-76-136 to 142 No results above action level (0.2ug/100cm^2) or investigative level (0.1ug/100cm^2).
Beryllium	B771 AF 771074 (1st Floor South East)	7 biased (interior)	7 biased (interior)	No beryllium contamination found at any location, all results below the regulatory limit	OSHA ID-125G RIN 771-07202004-76-108 to 114 No results above action level (0.2ug/100cm^2) or investigative level (0.1ug/100cm^2).
Radiological	B771 AF 771075 (1st Floor North East)	175 α TSA (175 – Random/Systematic) and 175 α Smears (175 - Random/Systematic) 9 QC TSA 100 % scanned	175 α TSA (175 – Random/Systematic) and 175 α Smears (175 - Random/Systematic) 9 QC TSA 100 % scanned	No elevated contamination at any **random** location; all values below PDS unrestricted release levels No result above action level All results less than	Transuranic DCGLs Random survey locations that landed on previously identified "hot-spots" (i.e., areas shaded in red on survey unit overview maps) were relocated as close to the original location as possible within the continguous square-meter. When this was not possible, a new random location was selected from a random-number generator. No results above DCGLw identified at random locations.

Table E-3 Data Completeness Summary (Areas within 6' of Final Grade) – B771 AF (1st Floor East Side)

ANALYTE	Building/Area /Unit	Sample Number Planned (Real & QC)^A	Sample Number Taken (Real & QC)	Project Decisions (Conclusions) & Uncertainty	Comments (RIN, Analytical Method, Qualifications, etc.)
				DCGLs, except as noted in red on survey unit scan map (Att. C)	
Radiological	B771 AF 771074 (1st Floor South East)	89 α TSA (89 – Random/Systematic) and 89 α Smears (89 - Random/Systematic) 5 QC TSA 100% scanned	89 α TSA (89 – Random/Systematic) and 89 α Smears (89 - Random/Systematic) 5 QC TSA 100% scanned	No elevated contamination at any random location; all values below PDS unrestricted release levels No result above action level All results less than DCGLs, except as noted in red on survey unit scan map (Att. B)	Transuranic DCGLs Random survey locations that landed on previously identified "hot-spots" (i.e., areas shaded in red on survey unit overview maps) were relocated as close to the original location as possible within the continguous square-meter. When this was not possible, a new random location was selected from a random-number generator. No results above DCGLw identified at random locations.

Table E-3 Data Completeness Summary (Areas within 6' of Final Grade) – B771 AF (1st Floor East Side)

ANALYTE	Building/Area /Unit	Sample Number Planned (Real & QC)[A]	Sample Number Taken (Real & QC)	Project Decisions (Conclusions) & Uncertainty	Comments (RIN, Analytical Method, Qualifications, etc.)
Radiological	B771 AF 771088 (Stairwell # 3)	15 α TSA (15 – Random/Systematic) and 15 α Smears (15 – Random/Systematic) 2 QC TSA 12% scanned	15 α TSA (15 – Random/Systematic) and 15 α Smears (15 – Random/Systematic) 2 QC TSA 12% scanned	No elevated contamination at any random location; all values below PDS unrestricted release levels No result above action level	Transuranic DCGLs

Table E-4 Data Completeness Summary (Areas Greater than 6' Below Final Grade) – B771 AF (1st Floor East Side)

ANALYTE	Building/Area /Unit	Sample Number Planned (Real & QC)^A	Sample Number Taken (Real & QC)	Project Decisions (Conclusions) & Uncertainty	Comments (RIN, Analytical Method, Qualifications, etc.)
Radiological	B771 AF (Greater than 6' Below Final Grade)	15 Random In-Situ Gamma-Spectroscopy 100% Scan with Bicron Fidler (NaI)	15 Random In-Situ Gamma-Spectroscopy	No radiological contamination found at any location in excess of action levels	No results above action level of 7 nCi/g (volumetric) or 100 nCi/g (surficial) for Am-241 and Pu-239 No results above action level of 250,000 cpm
Beryllium	B771 AF (Greater than 6' Below Final Grade)	See Table E-3	See Table E-3	No beryllium contamination found at any location, all results below the regulatory limit	The beryllium swipes presented for survey units 771075 and 771074 were all collected on the floor (horizontal) surfaces. The floors are greater than 6' below final grade. ¡Therefore, the beryllium data collected for the respective survey units were collected in areas greater than 6' below final grade.

ATTACHMENT G

Historical Review

Area AF (B771 Plutonium Process Area)
Historical Review
September 10, 2004

Facility ID: Building 771 1st Floor Area (Survey Area AF)

Anticipated Facility Type (1, 2, or 3):

Survey area AF is part of a Type 3 Facility.

Physical Description:

Building 771 is located in the north-central section of RFETS Industrial Area. The building is predominantly constructed of reinforced concrete, with some non-production portions of the building constructed of concrete block and fabricated metal. The original building was a two-story structure built into the side of a hill with most of the three sides covered by earth. The fourth side, facing the north, provides the main entrance to the building. The original building measures 263 feet (north to south) by 282 feet (east to west) on the ground floor, and 202 feet by 282 feet on the second floor. The building is 31 feet tall, and there are no outside windows in the main building. The Building 771 Area AF was part of the original building.

Historical Operations:

Room 149 had many different process over the last 35-40 years, including skull oxide dissolution, solvent extraction, ion exchange, incineration, trough dissolution, glove washing, peroxide precipitation, calcination, conversion of green cake to PuF4HF, hydrofluroination, reductions and button break-out, Am processing, feed evaporation, HCL dissolution and cation exchange, cascading oxide dissolution, cascading SS&C, crushing and grinding of ash, Nash Pump vacuum operations, Bingham vacuum operations, and many other plutonium recovery processes.

Room 114 became the Fast Side Recovery after the 1963/64 Plutonium Recovery expansion. This room had new gloveboxes for Am recovery and processing, and gloveboxes for Pu metal dissolution and other miscellaneous processing. A new Line 3 was installed for dissolution of plutonium oxides. Many other new gloveboxes were installed during the expansion for ion exchange, Nash vacuum operations, rotary tube calcination, rotary tube hydrofluorination, batching, precipitation, feed evaporation, spray dissolution, and Pu tetrafluoride reduction to Pu metal. Rooms 114B and 112 were the new Reduction and Button Break Out and Control Room areas.

Room 141 Process Area. This room was originally was constructed as a SNM Vault and was later converted to a "House Vacuum" pump room. Operational problems with the pumping operations in Room 141 resulted in spills of radionuclide bearing acidic solution that contaminated the concrete and pedestals. Operation of Room 141 was eventually phased out. Subsequent remediation actions to remove the contaminated concrete resulted in high airborne concentrations of Pu, and the room was eventually sealed. Lead shielding existed during the pump operation period, and it is expwcted that acid spills may have deposited lead contamination in the concrete structures of the room. It is estimated that several grams of SNM holp-up were present in the concrete and room structures.

Rooms 146 and 148 originally had duplicate, remotely operated Chemical Conveyor Lines (Chem Lines), and Room 147 was the control room. Each of the Chem Lines had Pu nitrate peroxide precipitation, green-cake calcination, green-cake hydrofluroination, metal reduction, and button break-out processes. The continuous Chem Line gloveboxes were connected on the south end (Room 181) by another continuous glovebox/conveyor line. Room 146 (north) later became the Plutonium Special Recovery area, with new gloveboxes, tanks and equipment installed. This new equipment allowed for special residue dissolution, ion exchange, precipitation, solvent extraction, and other related special recovery processes.

Current Operational Status

The Building 771 1st Floor (Area AF) is no longer operational. All major equipment/piping and non-load-bearing walls have been removed. The structure surfaces have been decontaminated.

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Area AF (B771 Plutonium Process Area)
Historical Review
September 10, 2004

Contaminants of Concern

Asbestos

The Building 771 1st Floor Area AF was part of the original construction, therefore the presence of ACM was suspected. A Certified Building Inspector performed a complete inspection of the area and sampled the suspect materials. Asbestos-Containing Material (ACM) was identified in the following materials:

- silver-painted flashing (to be removed per the demolition plan)
- drywall joint compound (removed)
- mudded fittings on domestic water and steam condensate piping (removed)

Beryllium (Be)

Area AF is not and has never been a beryllium-controlled area. Based on extensive Be surveys throughout B771 and B774, no beryllium contamination is present on building surfaces in Building 771 (refer to B771 and B774 Hazards Characterization Report, 771 Closure Project). However, beryllium contamination was identified in some process equipment (gloveboxes and tanks).

Lead

The remaining paint in the AF area will not be removed from the substrate.

Although the AF Area paint was not specifically sampled and evaluated for lead, the samples collected from other areas of Building 771 are considered representative of the expected lead levels in Area AF. Analysis of 61 paint samples from the process areas of the 771/774 complex indicates that lead levels are below regulatory limits in paint.

RCRA/CERCLA Constituents

Based upon the *B771 and B774 Hazards Characterization Report, 771 Closure Project*, Revision 0, dated June 12, 2001, personnel interviews, facility walk-downs, and historical process knowledge (WSRIC/WEMS), several portions of Area AF previously managed hazardous wastes. Specifically, Room 181A was a permitted hazardous waste container storage units. This unit has been decontaminated (e.g., hydrolazed) in accordance with the 771 Decommissioning Operations Plan and has met the "clean closure" decontamination criteria. A visual inspection of the building by 771/774 Industrial Hygiene personnel verified the absence of hazardous waste residuals and/or stains on the floor/concrete slab, walls, or ceiling.

PCBs

Free-flowing or exposed PCBs have never been used or transferred in Area AF. PCB ballasts in fluorescent light fixtures were present throughout the area, and have been removed and disposed of. PCBs may be present in some applied paints. Because additional paint sampling was not performed in Area AF, and because painted surfaces remain in the area (cinderblock and concrete walls), any painted debris generated during demolition that is not recycled on-site will be disposed of a PCB bulk product waste.

Radiological Contaminants

The contaminants of concern for the 771 project, including all areas of Buildings 771 and 774, are transuranic alpha-emitting radioisotopes (including Pu-238, Pu-239/240, Pu-242, and Am-241). Based on findings documented in Radiological Engineering TBD-00161, Rev. 0, alpha-only surveys assure that the unrestricted-release limits for any other isotopes that may exist in Building 771/774 will not be exceeded.

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Area AF (B771 Plutonium Process Area)
Historical Review
September 10, 2004

Environmental Restoration Concerns

UBC sampling performed inside the B771 footprint has been performed. Based on the preliminary results, no remedial action is anticipated.

Additional Information

None

References

(1) *B771 and B774 Hazards Characterization Report for the 771 Closure Project*, dated June 12, 2001, Revision 0.

(2) *Building 771/774 Cluster Closure Project Reconnaissance Level Characterization Report*, dated August 8, 1998, Revision 2.

Further Actions

Complete the PDS process.

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ATTACHMENT H

SAP for Areas Greater than 6' Below Final Grade and Final Results

Building 771/774 Closure Project Characterization Plan For Areas Greater than Six Feet Below Final Grade

Final
11/14/03

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

This Characterization Plan identifies the characterization and verification approach for portions of Building 771/774 that contain fixed areas of contamination. As stated in the 771 Closure Project Decommissioning Operations Plan Modification 5 (DOP), the objective of this characterization plan is to ensure that the nature and extent of contamination is adequately defined and that the material that will be left in place is consistent with the framework for contaminated soil. The areas that have not been decontaminated to the unrestricted release criteria and will remain in place after backfilling will be characterized in accordance with this project-specific characterization package prepared in accordance with the Decontamination and Decommissioning Characterization Protocol and the Industrial Area Sampling and Analysis Plan. The slab and structure within 0 to 6 feet of the final proposed grade will be decontaminated to the unrestricted release criteria and 0 to 3.5 feet will be removed during demolition. The Building 771/774 slab and structure below 6 feet of the final proposed grade will be decontaminated to ensure that it will not exceed 7 nCi/g (over depth of volume) and/or 100 nCi/g (surface). The described characterization methods are based on the Data Quality Objectives of the Industrial Area Sampling and Analysis Plan (IASAP)(DOE 2001a).

2.0 EXISTING CHARACTERIZATION INFORMATION

The contaminant of concern in Building 771/774 is weapons-grade plutonium, which consists primarily of Pu-239/240 and Am-241 (which is present as a result of ingrowth from the decay of Pu-241). These three isotopes represent over 98% of the total activity per gram of WGP. Other incidental radionuclides were utilized for various processes in Building 771 and 774, including enriched and depleted uranium, and mixed fission products (MFP). However, a review of the *in-situ* gamma-spectroscopy data did not indicate the presence of the associated radioisotopes on structural surfaces (refer to Attachment A).

The locations of the existing random *in-situ* data were selected per the requirements of RSP-09.09, Radiological Characterization of Low Specific Activity Waste by Field Sampling and Analysis. This procedure describes a method to calculate conservative estimates of material activity concentration based on random sampling and calculation of the upper confidence limit (UCL_{95}) of the mean concentration. The statistical evaluation also assumes a lognormal distribution with the intention of biasing results high to provide a high degree of confidence that no transportation or waste acceptance criteria is exceeded. However, because many areas exceeding the specified limits have been identified through this sampling effort, no statistical evaluations of the existing data set will be performed. However, a statistical evaluation will be performed for verification sample data, as described in Section 5.0.

Each characterization unit represented one room or area with similar process histories and contamination potential. Building 771 was divided into seven areas and fifteen random measurements were collected in each unit (with the exception of the Room 182, from which five samples were collected due to previously-existing work interferences). Additional biased *in-situ* measurements were collected in Room 148 and in Building 774.

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Ninety (90) paint samples were collected on the second floor of Building 771 as part of the Reconnaissance Level Characterization (RLC) effort. Fifteen (15) paint samples were collected in Room 241 of Building 774 were also collected during RLC. Additional biased ZnS measurements were collected in non-process areas of Building 771 as part of Phase 2 of the UBC characterization effort. Additional paint and *in-situ* measurements were collected in the Building 771/776 tunnel as part of the hydrolazing waste characterization effort. A summary of the type of data collected is presented in Table 1.

A total of 297 biased and random data points have been collected. Thirty-three (33) of the *in-situ* data points, were collected on structural walls and ceilings. None of these structural wall/ceiling data points exceeded 100 nCi/g at the surface and/or 7 nCi/g averaged over the wall/ceiling depth. Based on the *in-situ* gamma spectroscopy data, the average volumetric activity is approximately 9 nCi/g for the slab and 0.03 nCi/g for the wall/ceiling surfaces, indicating that greater than 99% of the remaining activity exists in the slab.

Floor and wall shots in Old Tank 40 (B774) did indicate contamination in excess of 100 nCi/g at the surface. Therefore, remediation will be required on the walls as well as the slab of Old Tank 40.

A summary map of the results for the first floor of Building 771 and Building 774 is presented in Figure 1. No summary map is presented for the second floor of Building 771, given that all surface paint sample results were less than 1 nCi/g.

3.0 POST-REMEDIATION SCANNING (> 6' BELOW FINAL GRADE)

Following the decontamination of the slab, a 100% scan of the slab surfaces will be performed with a qualitative field instrument to verify that all areas in excess of 100 nCi/g have been remediated. Any area flagged as potentially greater than 100 nCi/g will either be remediated or verified to be less than 100 nCi/g with a quantitative instrument (i.e., in-situ gamma-spectroscopy or laboratory sample analysis method).

4.0 VERIFICATION SAMPLING (> 6' BELOW FINAL GRADE)

Following completion of remediation activities and the collection of biased post-remediation data, an additional verification sampling effort will be performed on slab surfaces that will remain *in-situ* 6' below final grade. The objective is to verify with 95% confidence that the average slab activity is less than 100 nCi/g (surficial) and 7 nCi/g (volumetric) Pu-239 and Am-241, and to provide an estimate of the average remaining slab activity. In addition, the data will be evaluated for the presence of other incidental radioisotopes, including Radium-226 and Uranium-235, although existing data does not indicate the presence of these isotopes in 771 (refer to Attachment A). The locations of the random sample locations will be selected per a simple non-parametric statistical method (Sign Test) described in Section 8.3 of the MARSSIM manual (refer to Attachment B). Building 771 will be divided into three units, and 774 into one unit (refer to Table 3). The number of samples required will be based on standard deviation

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estimates derived from existing data, and verified to be adequate based on actual standard deviations.

5.0 NON-RADIOLOGICAL CONTAMINANTS

The non-radiological contaminants of concern, including beryllium (Be), asbestos (ACM), poly-chlorinated bi-phenyls (PCBs), RCRA contaminants, including lead (Pb), will be evaluated per existing site requirements for demolition. A discussion of each contaminant and path forward is provided below.

Beryllium will be evaluated per the requirements of the PDSP. Asbestos shall be removed and controlled per the requirements of Colorado Department of Public Health and Environment Regulation No. 8, Part B, and OSHA 29 CFR 1926.1101. PCB-based paints shall remain in place and the control measures outlined in the Risk-Based Approach memorandum (8EPR-F) shall be implemented during demolition. RCRA contaminants, including any RCRA closures, shall be evaluated per the requirements of the B771 DOP. Lead analysis of paint from the process areas of the 771/774 complex has revealed lead levels above regulatory limits in only one out of 61 samples taken, and the elevated level was only found in the stack exhaust tunnel (on an orange-colored sealant). Additional sampling will be performed in the exhaust tunnel in order to determine the path forward.

6.0 REPORTS

Upon completion of verification sampling, a final report shall be generated that includes the information described below.

- An overview map delineating decontaminated areas and post-remediation sample results
- The individual verification sample results and statistical evaluation (by survey unit)
- The average remaining activity (by survey unit)
- The conclusion for each survey unit

7.0 MAPS

The final grade maps are presented in Figure 2.

8.0 REFERENCES

DOE, 2001, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

MAN-127-PDSP, Pre-Demolition Survey Plan for D&D Facilities, Revision 0, Golden, Colorado, April 23, 2001.

PRO-1564-RSP-09.09, Radiological Characterization of Low Specific Activity Waste by Field Sampling and Analysis, Revision 0, Golden, Colorado, 9/26/02.

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Table 1
Number and Type of Existing Characterization Data

Location	No. of Samples	Media	Depth Interval	Analyte	Method
Building 771	16	Paint	Surface	Gross α	Alpha Spec.
	32	Concrete	1 in.	Gross α	ZnS Detector [1]
	100	Concrete	7 in. [2]	Pu-239/240 [3] Am-241	*In-Situ* Gamma Spec.
B771/B776 Tunnel	17	Paint	Surface	Pu-239/240 [3] Am-241	Gamma-Spec.
	6	Concrete	7 in. [2]	Pu-239/240 [3] Am-241	*In-Situ* Gamma Spec.
B771, Second Floor	90	Paint	Surface	Pu-239/240 Am-241	Alpha Spec.
Building 774	11	Concrete	1 in.	Gross α	ZnS Detector [1]
	15 [4]	Paint	Surface	Pu-239/240 [3] Am-241	Alpha Spec.
	10	Concrete	7 in. [2]	Pu-239/240 [3] Am-241	*In-Situ* Gamma Spec.

(1) Field survey of concrete core at 1" depth
(2) Assumed conservative slab depth (actual ranges from 7 to 12 in.)
(3) When Pu-239 gamma line not detected, determined by multiplying detected Am-241 concentration by 6.95 (assumes 34-year WGP)
(4) Collected in Room 241 (all results less than 0.1 nCi/g)

Table 2
Characterization Data Summary and Identified Data Gaps

Areas	Areas Evaluated	# Random Samples [1]	# Biased Samples [2]	Remediation Required?	# Locations > 100 nCi/g (surface)	# Locations > 7 nCi/g (volumetric)	Data Gaps Identified?	Additional Characterization Samples Required [3]
Rooms 183 through 187	Slab/Wall/Ceiling	15	9	No	0	0	No	0
Rooms 181A, 182, 182A	Slab/Wall/Ceiling	5	6	No	0	0	YES	10
Former Room 170s, 180s (South end former Labs)	Slab/Wall/Ceiling	15	5	YES	1	1	No	0
Former Room 150s, 160s (North end former Labs)	Slab/Wall/Ceiling	15	9	YES	0	0	No	0
Room 114, 114A, 114B, 112, and Corridor G Floors	Slab	15	8	YES	2	1	No	0
Room 149, 149A, and 148 Floors	Slab	15	3	YES	1	1	No	0
Room 146, 146A, 146C, 140s and 147s	Slab	15	0	YES	1	1	No	0
B771 Room 148	Slab	0	5	YES	3	0	No [5]	0
B771/B776 Tunnel	Slab	15	8	YES	2	2	No	0
B771, Second Floor	Slab/Wall/Ceiling	90	0	No	0	0	No	0
B774	Slab/Wall	15 [4]	21	YES	8	5	No [5]	0
B771 Non-Process Areas	Slab	0	5	No	0	0	No	0

(1) *In-situ* gamma spectroscopy performed for all random locations
(2) Biased locations surveyed via *in-situ* gamma spectroscopy, ZnS field surveys, and paint sample analysis.
(3) Does not include post-remediation confirmation samples, or verification samples.
(4) Collected in Room 241.
(5) Only biased samples were collected in Rooms 148, and Building 774 Rooms 102, 103 and Old Tank 40. Due to extensive remediation required, no additional random samples will be collected as part of the characterization effort. Post-remediation samples and verification samples shall be collected.

Table 3
Verification Survey Units (Slab Surfaces > 6' Final Grade)

Verification Survey Unit ID	Building	Description	Estimated Surface Area (m^2)
A	771	West Side Process Area	1970
B	771	East Side Process Area	2815
C	771	Second Floor	1260
D	774	Rooms 102, 103, 241, Old Tank 40	1130

EBERLINE SERVICES
RFETS
SUMMARY REPORT

Spectroscopy Date: August 2002 through April, 2003

Location: RFETS Building 771, 774.

Customer: Chris Lee

Description: Uranium-235(^{235}U) concentrations for floors and walls in B771 and B774

Summary: **There is no indication in any of the wall, floor or ceiling assays of either B771 or B774 of enriched uranium.** In the initial evaluation of these spectra all peaks that were observed were identified. No gamma rays for mixed fission products or activation products were detected in any of the assays, Tank 40 included.

^{235}U concentrations in the B771 sample locations were not high enough to indicate anything but natural isotopic abundance. All radium-226(^{226}Ra) peaks were consistent with background levels observed throughout Building 771 and Building 776.

Previously modeled data indicated that ^{235}U concentrations in B774 were not high enough to indicate anything but natural isotopic abundance, with the exception of old Tank 40. It is the only assay location in either building where the relationship between the ^{226}Ra and the uranium isotopes indicates some form of uranium purification. Because the uranium's depth distribution in the concrete is not known, a conclusive evaluation of this sample point is not possible with in-situ measurements. Because the ^{226}Ra levels seem to be similar to the natural levels, and the ^{238}U appears to be elevated, it is possible that some depleted uranium exists in the bottom of Tank 40. No other locations in B774 have detectable amounts of ^{238}U. Any ^{235}U present cannot be distinguished from the naturally occurring ^{226}Ra.

Detail

At the request of Building 771 radiological engineering, the spectra collected in B771 were re-evaluated for the potential presence of ^{235}U. Because it is a naturally occurring isotope, its presence could not be ruled out, but because of interference from other naturally occurring isotopes, it could not always be detected. Minimum detectable activities (MDA's) were calculated for ^{235}U.

Values for ^{235}U in this report are higher than those actually present. It's most abundant gamma line could not be resolved from the gamma line for naturally occurring ^{226}Ra. The most abundant peak for ^{235}U at 185.74 keV was used because it still provided a lower MDA than the second most abundant peak, which did not have interference from nearby peaks. In most cases, radium's daughter product, lead-214, was used to indicate the samples in which interference from ^{226}Ra caused estimates of ^{235}U to be affected by more than 50%. A separate column in the report was added to indicate when ^{226}Ra dominated the region of interest used to calculate the ^{235}U MDA. No attempt was made to adjust the estimate in an effort to minimize the number of assumptions used in these calculations. The high values were still reported for conservatism.

Assumptions/Deviations: All contamination was modeled as existing in a thin layer just under the paint to provide a worst-case scenario. If the contaminant had been modeled as existing throughout the concrete slab, the MDA's would have been significantly lower.

Analyst: B P Ah Date: 9/9/04

Reviewer: William R Sallaway Date: 9/9/04

CC: ES files

Attachment B
Verification Sampling Statistical Design

Characterization Unit:		Building:	
Characterization Unit Description:			

Step 1: Calculate the relative shift Δ/σ_s

$\Delta/\sigma_s = (DCGL \cdot LBGR)/\sigma_s$

where:

Δ/σ_s is the relative shift or the resolution of measurements in units of measurement uncertainty (MARSSIM recommends a value between 1 and 3).

DCGL is the derived concentration guideline value (7 nCi/g volumetric and 100 nCi/g surficial)

LBGR is the lower bound of the gray region - the lower bound of the range of values of the parameter of interest in a survey unit where the consequences of making a decision error is relatively minor. The LBGR is typically adjusted to obtain a relative shift between 1 and 3.

σ_s is the estimated standard deviation of the total surface activity measurements (MARSSIM recommends assuming a 30% coefficient of variation if scoping or characterization data is not available)

Step 2: Determine Sign P using the calculated relative shift and Table 4. Sign p is the estimated probability that a random measurement from the survey unit will be less than the $DCGL_w$ when the survey unit median is actually at the LBGR.

Step 3: Determine Decision Error Percentiles for $Z_{1-\alpha}$ and $Z_{1-\beta}$ and the selected decision error levels α and β. Typical (α) and (β) values used at RFETS are 0.05 and 0.05 respectively. This yields a $Z1-\alpha$ and $Z1-\beta$ value of 1.645 and 1.645 respectively.

Step 4: Calculate Number of Data Points (N) for Sign Test using the following equation:

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(Sign\ p - 0.5)^2}$$

where:

1.645 is the alpha and beta decision error value (95% confidence) per the PDSP

Sign P equals 0.977250 for a relative shift of 2.0

Step 4: Increase N by 20% to allow for missing or invalid data points per MARSSIM, Section 5.5.2.3.

Figure 1
Characterization Data Summary
Page 1 of 2

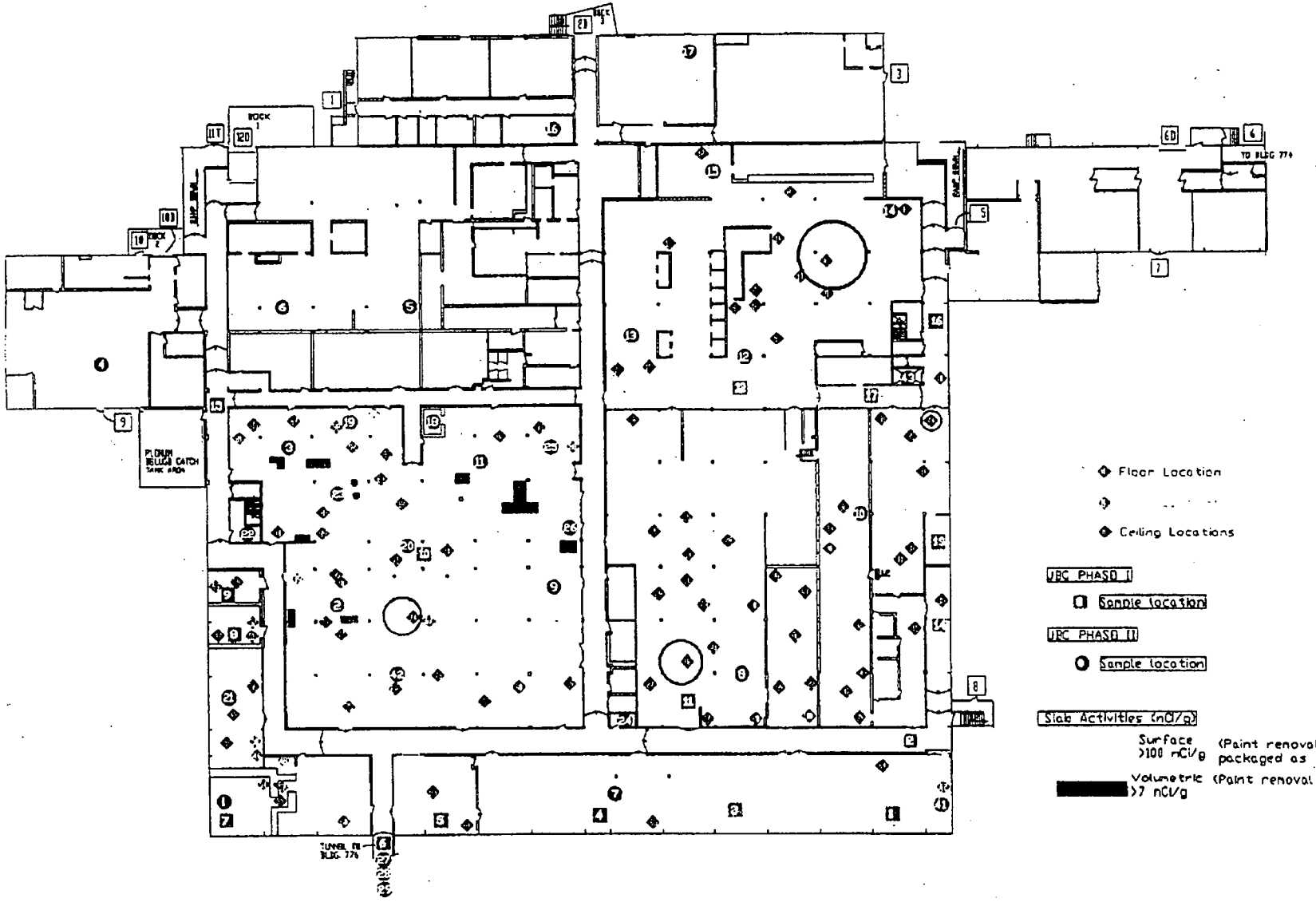
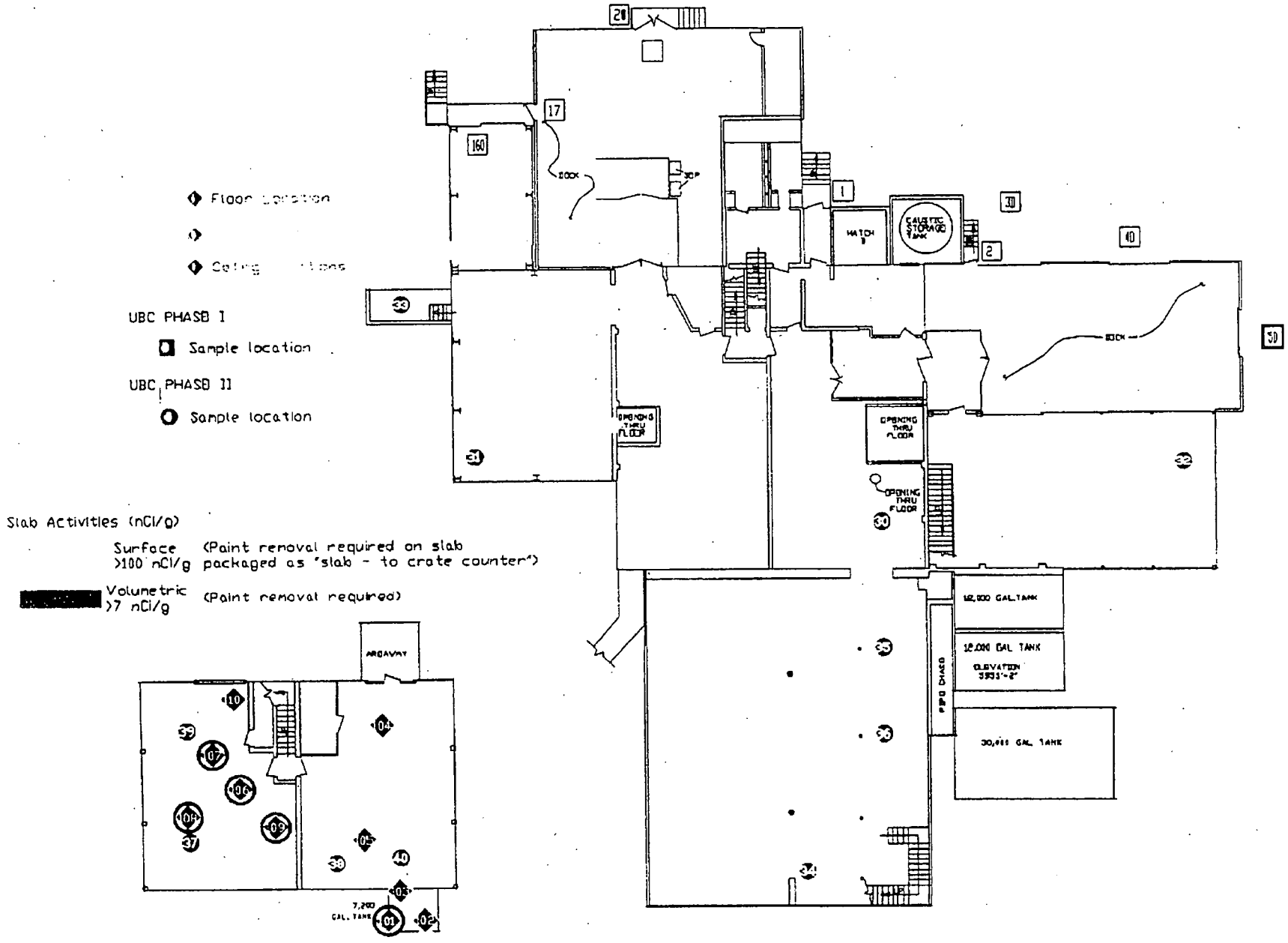
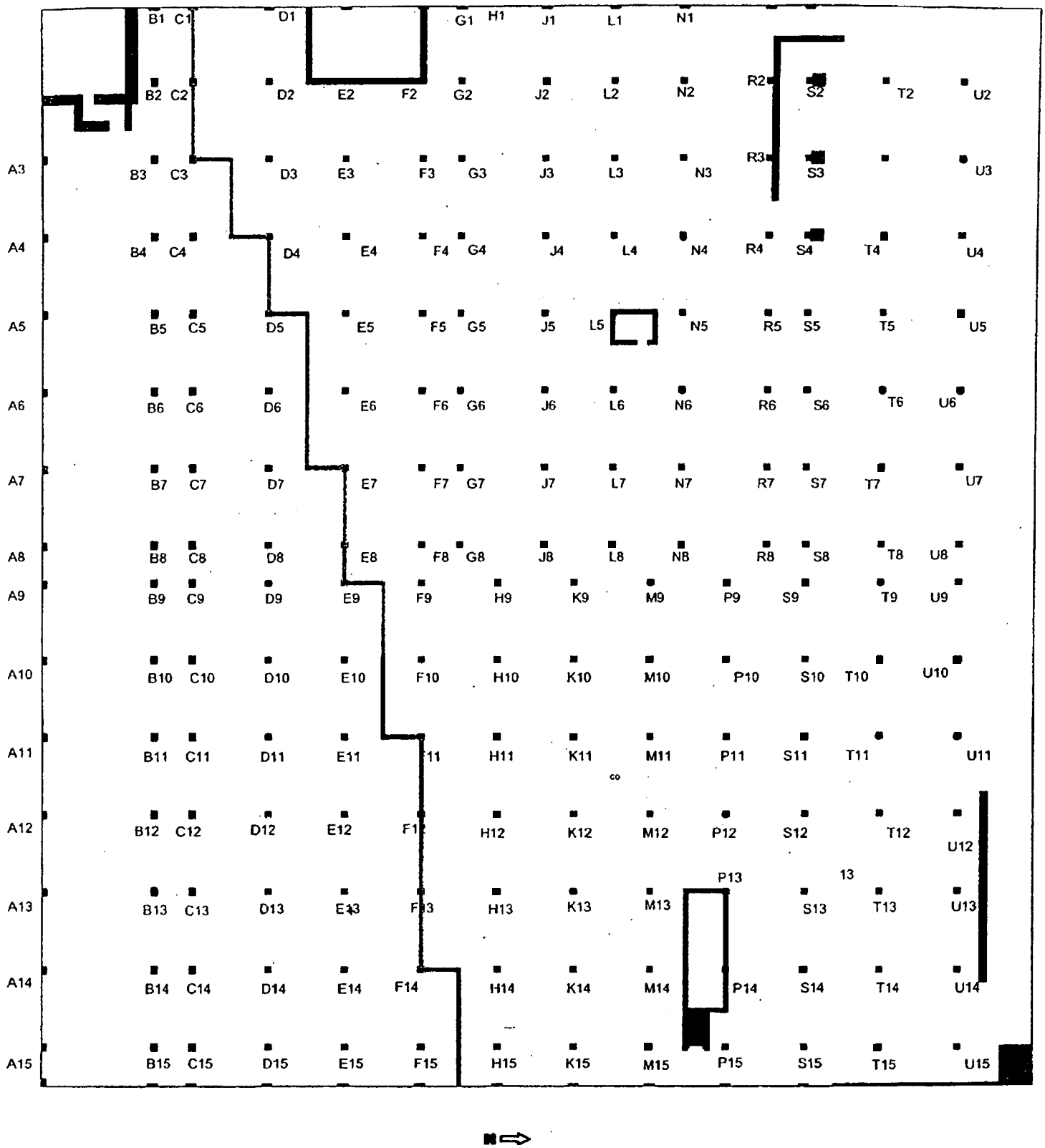


Figure 1
Characterization Data Summary
Page 2 of 2



Building 771 First Floor Ceiling Final Grade



771 Second Floor Final Grade Line

Random *In-Situ* Measurements for Area AF
(Survey Unit B)

Building 771 1st Floor Area Surveys

Area ID	Detect?	Detector	Spectrum File ID	SNAP Am241 Activity Concentration (nCi/g)	SNAP Am241 Activity Concentration MDA (nCi/g)	Pu-239/240 Activity Concentration (nCi/g)	Total Alpha Concentration (Am-241 + Pu-239/240) (nCi/g)	Assumed Contamination Depth (inches)	Assumed Slab Thickness (inches)	Estimated Average Pu-239/240 Slab Activity Concentration (nCi/g)	Estimated Average Pu-239/240+Am-241 Slab Activity Concentration (nCi/g)	Calc. Case
AF/15 (West of 126" P10 x 105" S10)	Y	33-TN40488A	07300401	3.29E-01	5.53E-02	2.29E+00	2.62E+00	0.060	7.0	1.96E-02	2.24E-02	1
AF/11 (South of 168" U11 x 56" U12)	Y	33-TN40488A	07300402	1.18E-01	5.20E-02	8.20E-01	9.38E-01	0.060	7.0	7.03E-03	8.04E-03	1

Notes,

< sign indicates number is an MDA for that measurement.

Activity per gram values for each isotope taken from TBD-00078, Activities for Isotopes of Concern in Weapons Plutonium as a Function of Time, for 34 year old plutonium.

Total activity calculation based on one of four cases listed in Assumptions and Calculations sheet.
Case 1 - only Am241 (59 kev peak) detected. Pu239 estimated based on RFETS WgPu ratios.
Case 2 - both Am241 (125 kev peak) and Pu239 (129 kev) peaks detected.
Case 3 - Am241 (59 and 125 kev peaks) detected. Pu239 results are based on the MDA.
Case 4 - no Am241 or Pu239 peaks detected. Results are based on the MDAs.

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Building 771 Floor Surveys

Map/Room	Area Type / #	Detect?	Detector	Spectrum File ID	SNAP Am241 Activity Concentration (nCi/g)	SNAP Am241 Activity Concentration MDA (nCi/g)	Pu-239/240 Activity Concentration (nCi/g)	Total Alpha Concentration (Am-241/Pu-239/240) (nCi/g)	Total Alpha MDA (nCi/g)	Assumed Contamination Depth (inches)	Assumed Total Thickness (inches)	Estmated Average Pu-239/240 Slab Activity Concentration (nCi/g)	Estmated Average Pu-239/240+Am-241 Slab Activity Concentration (nCi/g)
B771 First Floor	AF / 10	Y	33-TN40488A	05040404	1.07E+00	1.76E-02	7.44E+00	8.51E+00	1.45E-01	0.06	7.00	6.38E-02	7.29E-02
B771 First Floor	AF / 3	Y	33-TN40488A	05040407	2.77E-01	1.83E-02	1.93E+00	2.20E+00	1.51E-01	0.06	7.00	1.65E-02	1.89E-02
B771 First Floor	AF / 2	Y	33-TN40488A	05040408	1.44E-01	1.60E-02	1.00E+00	1.14E+00	1.32E-01	0.06	7.00	8.58E-03	9.81E-03
B771 First Floor	AF / 1	Y	33-TN40488A	05040409	3.30E+00	1.89E-02	2.29E+01	2.62E+01	1.56E-01	0.06	7.00	1.97E-01	2.25E-01

NOTES:

1. Specific activity values for each isotope are taken from TBD-00076, "Activities for Isotopes of Concern in Weapons Plutonium as a Function of Time", for 34 year old plutonium.

2. Differential peak analysis indicated contamination could be as deep as 3 inches. Survey point modeled accordingly.

Building 771 1st Floor Area AF Surveys

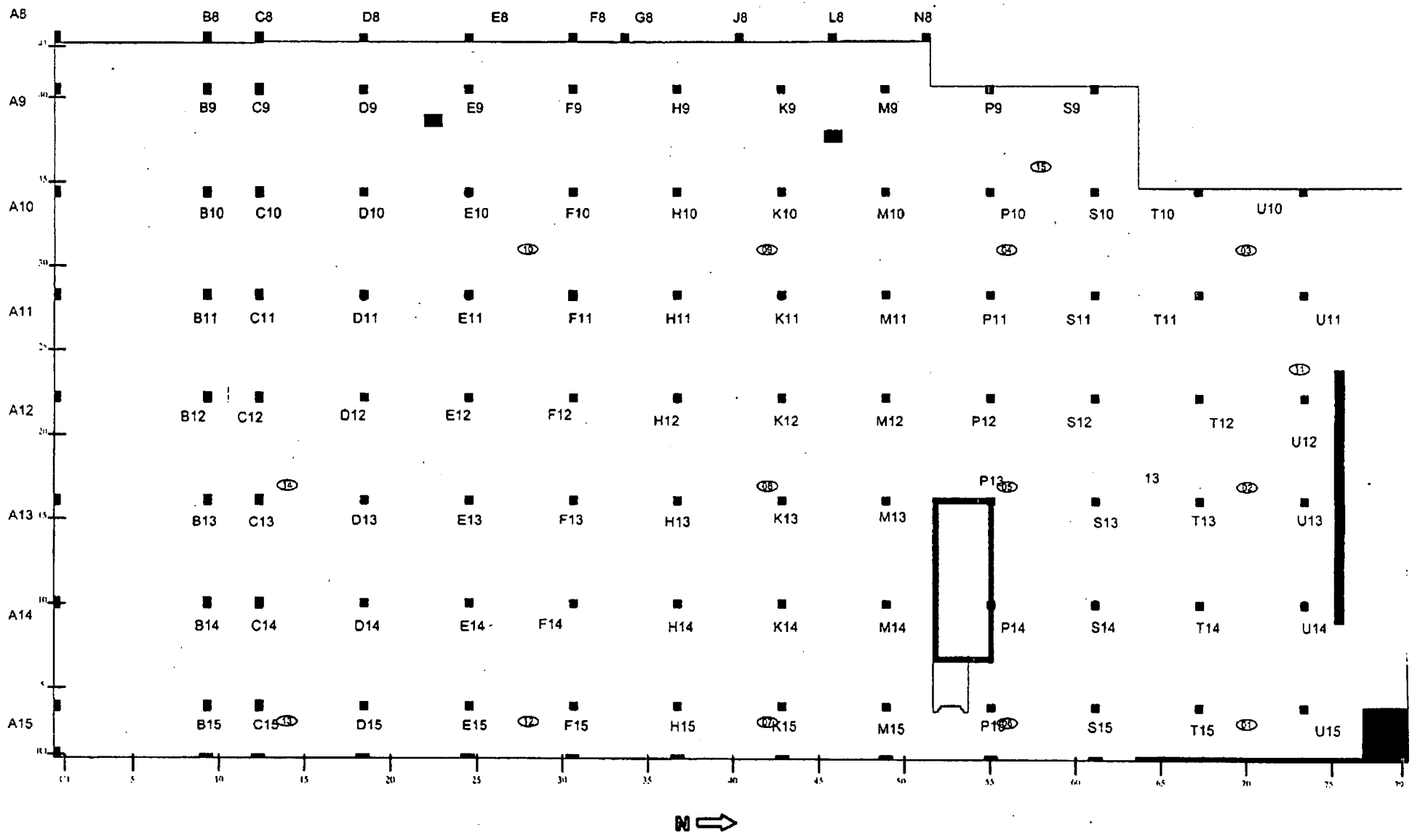
Area ID	Detect?	Detector	Spectrum File ID	SNAP Am241 Activity Concentration (nCi/g)	SNAP Am241 Activity Concentration MDA (nCi/g)	Pu-239/240 Activity Concentration (nCi/g)	Total Alpha Concentration (Am-241 + Pu-239/240) (nCi/g)	Assumed Contamination Depth (inches)	Assumed Slab Thickness (inches)	Estimated Average Pu-239/240 Slab Activity Concentration (nCi/g)	Estimated Average Pu-239/240+Am-241 Slab Activity Concentration (nCi/g)	Calc. Case
1st Floor Area AF-14 (North of 192" C12 x 54" C13)	Y	31-TN30637A	07210405	2.72E-01	9.00E-02	1.89E+00	2.16E+00	0.060	7.0	1.62E-02	1.85E-02	1
1st Floor Area AF-12 (East of 130" E15 x 98" F15)	Y	31-TN30637A	07210406	1.13E-01	8.71E-02	7.85E-01	8.98E-01	0.060	7.0	6.73E-03	7.70E-03	1
1st Floor Area AF-7 (East of 184" H15 x 46" K15)	Y	31-TN30637A	07210407	1.24E+00	9.39E-02	8.62E+00	9.86E+00	0.060	7.0	7.39E-02	8.45E-02	1
1st Floor Area AF-13 (East of 41" C15 x 194" D15)	Y	31-TN30637A	07210408	1.31E-01	8.39E-02	9.11E-01	1.04E+00	0.060	7.0	7.80E-03	8.93E-03	1
1st Floor Area AF-8 (South of 192" K12 x 86" K13)	Y	31-TN30637A	07230401	3.76E+00	1.08E-01	2.61E+01	2.99E+01	0.060	7.0	2.24E-01	2.56E-01	1
1st Floor Area AF-9 (South of 112" K10 x 128" K11)	Y	31-TN30637A	07230402	2.49E+00	9.78E-02	1.73E+01	1.98E+01	0.060	7.0	1.48E-01	1.70E-01	1
1st Floor Area AF-4 (North of 124" P10 x 121" P11)	Y	31-TN30637A	07230403	2.92E+00	1.03E-01	2.03E+01	2.32E+01	0.060	7.0	1.74E-01	1.99E-01	1
1st Floor Area AF-5 (North of 177" P12 x 51" P13)	Y	31-TN30637A	07230404	7.26E+00	1.27E-01	5.05E+01	5.77E+01	0.060	7.0	4.33E-01	4.95E-01	1
1st Floor Area AF-6 (North of 55" P15 x 76" P16)	Y	33-TN40488A	07270401	4.06E-01	5.26E-02	2.82E+00	3.23E+00	0.060	7.0	2.42E-02	2.77E-02	1

1. < sign indicates number is an MDA for that measurement.

2. Activity per gram values for each isotope taken from TBD-00076, Activities for Isotopes of Concern in Weapons Plutonium as a Function of Time, for 34 year old plutonium.

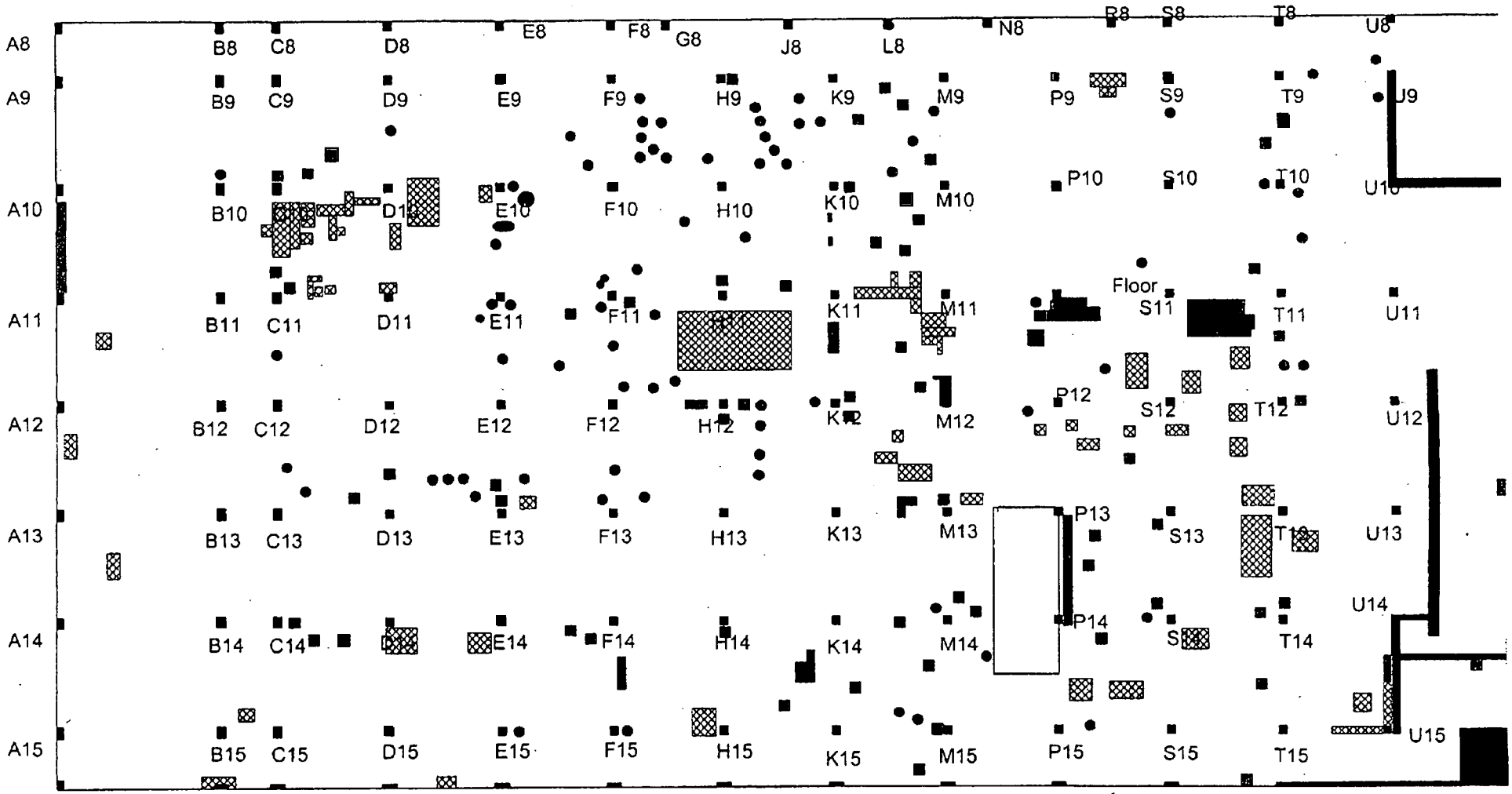
3. Total activity calculation based on one of four cases listed in Assumptions and Calculations sheet.

771 1st Floor
Area AF



Surface Scan (Fidler) Maps for Area AF
(Survey Unit B)

771 1st Floor (Area AF)



Updated 9/1/2004

N ⇨

To be cut out

Remediated

Scanned with fiddler

Estimated Grams of WGP Remaining in Area AF

Estimated Grams WGP Remaining
Area AF

Area AF Random In-Situ Gamma Spectroscopy Results	
Location	Volumetric Result for Pu-239/240 and Am-241 (nCi/g)
1	2.25E-01
2	9.81E-03
3	1.89E-02
4	1.99E-01
5	4.95E-01
6	2.77E-02
7	8.45E-02
8	2.56E-01
9	1.70E-01
10	7.29E-02
11	8.04E-03
12	7.70E-03
13	8.93E-03
14	1.85E-02
15	2.24E-02
mean =	1.08E-01
max =	4.95E-01
stdev =	1.38E-01

	Remaining Surface Area (ft^2)	Remaining Surface Area (m^2)	Remaining Surface Area (cm^2)	Assumed slab thickness (in)	Assumed slab thickness (cm)	Remaining Volume Concrete (cm^3)	Density Concrete (g/cm^3)	Total Remaining Activity (nCi)	SA 35-yr WGP (Ci/g)	Grams WGP (Alpha)
AF Floor	17244	1603	16028405.7	7	17.78	284985054	2.35	7.25E+07	8.24E-02	0.88
									Total Remaining Grams WGP=	0.88